WHAT COUNTS?

Business Analytics for Entrepreneurs

James M. Wilson III, PHD

$$Z - \text{test} = \frac{\hat{p} - p_0}{\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}}$$

$$P_i = \frac{100(i-0.5)}{n}$$

$$S\hat{y} = \sqrt{MSE}\sqrt{1 + \frac{1}{n} + \frac{(X_k - \overline{X})^2}{\Sigma(X_i - \overline{X})^2}}$$

$$Z \text{ calculated test score} = \frac{\hat{p} - p_0}{\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}} = \frac{0.46 - 0.50}{\sqrt{\frac{0.46(1-0.46)}{400}}} = -32$$

$$\left[\frac{Z\alpha/2\sigma}{ME}\right]^2$$

$$P_i = \frac{100(i-0.5)}{n}$$

$$\sum_{i=1}^{n} \frac{X_i}{n}$$

$$r = \frac{\sum_{i=1}^{n}\left((x_i - \overline{x})(y_i - \overline{y})\right)}{\sqrt{\sum_{i=1}^{n}(x_i - \overline{x})^2 \sum_{i=1}^{n}(y_i - \overline{y})^2}}$$

$$\frac{(X_{t+1} - X_t)}{X_t}$$

$$\sqrt{\frac{\sum_{i=1}^{n}(x_i - \overline{x})^2}{n-1}}$$

$$\hat{Y}_{t+1} = Y_t + \left(\frac{Y_t}{Y_{t-1}} - 1\right) \times Y_t$$

$$\frac{X - \mu}{\sigma}$$

$$\frac{Y_t - Y_{t-1}}{Y_{t-1}} = \frac{100 - 75}{75} = \frac{25}{75} = \frac{1}{3}$$

$$S\hat{y} = \sqrt{MSE}\sqrt{1 + \frac{1}{n} + \frac{(X_k - \overline{X})^2}{\Sigma(X_i - \overline{X})^2}}$$

$$\sum_{i=1}^{n} \frac{(x_i - \overline{x})^2}{n-1}$$

$$\frac{\overline{X}_D - \mu_0}{s_D/\sqrt{n}} = \frac{1.53 - 0}{1.41/\sqrt{30}}$$

$$\frac{(X_{t+1} - X_t)}{X_t}$$

$$\frac{\overline{X}_D - \mu_0}{s_D/\sqrt{n}} = \frac{1.53 - 0}{1.41/\sqrt{30}}$$

$$r = \frac{\sum_{i=1}^{n}\left((x_i - \overline{x})(y_i - \overline{y})\right)}{\sqrt{\sum_{i=1}^{n}(x_i - \overline{x})^2 \sum_{i=1}^{n}(y_i - \overline{y})^2}}$$

$$\frac{\hat{p} - p_0}{\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}}$$

$$\binom{150}{66} 0.4^{66} (0.6)^{150-66} + \binom{150}{65} 0.4^{67} (0.6)^{150-67} + \ldots + \binom{150}{150} 0.4^1 (0.6)^{150-150}$$

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What Counts: Business Analytics for Entrepreneurs by James M. Wilson III

For additional materials related to this text contact the author at questions@penserpress.com.

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Preface

Diligence is the mother of good luck.

Benjamin Franklin

What Counts aims to provide entrepreneurs with an introduction to business analytics through quantitative and qualitative methods. These analytics are used to monitor, guide, and exploit the full range of functional considerations in the firm.

What Counts is the second volume in the Tools for Business Value Creation series. The first book in the series, *Making the Case*, discusses the work of value proposition analysis and strategy. The third book, *Exploring Value,* describes research methods entrepreneurs can use to identify, capture, and sustain the delivery of value.

This text introduces the novice to elementary analytical methods. I empathize with readers who might find the concepts challenging, and I have done my best to introduce the material carefully and thoroughly. *What Counts* includes example mini-cases and worked-out problems to help make difficult material easier to understand. Readers can access additional resource material, which is available on the website for this book, by contacting the author at questions@penserpress.com.

Section I: Analytics and Cognition
This introductory section of the book provides an overview of the concept of analytics. Chapter 1, "An Overview of Analytics," explains:

- Definition of analytics
- Types of analytics

This section also asserts that analytics alone are not adequate to guide business strategy. Management needs to develop a technology infrastructure and cultivate organizational intelligence to benefit from analytics. Chapter 2, "Organizational Intelligence and Learning," and Chapter 3, "Challenges to Organizational Intelligence," explore:

- The cognitive view of management
- Business intelligence
- Organizational intelligence
- The dominant logic
- The challenges of using analytics
- Sources of cognitive bias
- Sources of organizational inertia

Section II: Data
Chapter 4, "Data Sources," Chapter 5, "Qualitative or Unstructured Data," and Chapter 6, "Quantitative Data," explain:

- The kinds of numbers and how they determine the kinds of statistical analyses that are possible
- How to process data to create information
- How grouping, sorting, and cross-tabulations improve understanding of data
- The difference between structured and unstructured data
- How to process each type of data
- Best practices for graphing
- How color can be used to best effect in graphing
- The basic kinds of graphs and the requirements of each

Section III: Descriptive Analytics
Descriptive analytics ask, "What has happened?" and "What is happening?" Chapter 7, "Data Analysis Without Statistics," and Chapter 8, "Descriptive Statistics," address:

- Summarizing data
- Variability of data
- Mean, mode, and median
- Standard deviation
- Correlation
- Cross-tabulation

Section IV: Diagnostic Analytics

Diagnostic analytics ask, "Why did this happen?" or "What is the cause of this?" To answer such questions requires understanding how probability is used for statistical inference. Chapter 9, "Samples, Probability, and Inferential Reasoning," Chapter 10, "The Z-test and the Logic of Statistical Tests," Chapter 11, "The t-test," Chapter 12, "The F-test," and Chapter 13, "The χ^2 test," study:

- Central Limit Theorem
- Hypothesis testing
- Kinds of statistical tests
- Choosing among statistical tests
- How to execute them
- How to interpret their results

Section V: Predictive Analytics

Predictive analytics ask, "Why will it happen?" Chapter 14, "Regression Analysis," Chapter 15, "Regression Analysis–Advanced Topics," and Chapter 16, "Forecasting," detail:

- Prediction
- Regression
- Dependent and independent variables
- Interpolation and extrapolation
- Naïve, time series, and statistical forecasting models
- Linear and data
- Methods for dealing with nonlinear data
- How to improve methods of forecasting

Section VI: Prescriptive Analytics Overview

Prescriptive analytics ask, "Why should it happen?" and methods that can answer this question are addressed in Chapter 17, "Optimization, Probabilistic Models, and Simulations," and Chapter 18, "Prescription and Classification" and address:

- What "prescriptive" means
- The mathematical methods for prescriptive analytics
- Optimization
- Probabilistic model
- Simulation
- Classification

Conclusion

The text concludes with a review and contextualization of the variety of material presented. Guidance is provided on how to organize and manage the use of analytics.

Appendix: Using Microsoft Excel for Analytics

Analytics require the use of statistical methods and mathematical programming. This appendix shows how the tools in Microsoft Excel can handle many of the demands for business analytics.

Glossary

This section succinctly defines a selection of keywords from the text. Key words in the text are introduced in italics.

Bibliography

The bibliography provides a list of sources used in the text, as well as other useful references.

WHAT COUNTS?
Business Analytics for Entrepreneurs

What Counts presents and explains quantitative and qualitative methods to identify, evaluate, and analyze relevant data to inform the pursuit of business value.

The book provides in-depth examples for the range of quantitative analytics, with illustrations and detailed step-by-step calculations.

The text describes qualitative methods used by ethnographers to process non-numeric data to make such data amenable to analytics.

Qualitative methods for structuring non-numeric data is extended to a discussion of artificial intelligence and machine learning methods needed to process the volume of non-numeric data generated on the internet.

"Professor Wilson has spent years guiding his students on how to formulate new ideas and then demonstrate their efficacy. His texts offer a fascinating collection of these tested methods, accompanied by insightful selections from the literature."

– Tom Loper, EdD, associate provost and dean, School of Science and Management, Bay Path University

"An idea must traverse numerous crossroads to arrive as socialized value to the market. Dr. Wilson's texts provide an articulation of this sequential, slice-by-slice evolution into value."

– Charles Sperry, inventor (150 patents)

These quantitative and qualitative methods are contextualized within the limits of organizational intelligence, business intelligence, and cognitive biases that challenge the valid interpretation of analytics.

TOOLS FOR BUSINESS VALUE CREATION
is a three-volume series. The other volumes are:

Making the Case: Value Proposition Analysis and Strategy walks readers through the due diligence essential for evaluating a value proposition. The book explains how to create a case study to evaluate the feasibility of a value proposition. Readers learn to investigate a business idea, using a step-by-step method for conducting "due diligence" to estimate market demand and financial viability.

Exploring Value: Research Methods for Entrepreneurs guides readers through the quantitative and qualitative methods vital to entrepreneurship. Qualitative methods include idea generation and selection, observation methods, interviews, focus groups, grounded theory, and knowledge creation. Quantitative methods encompass surveys, quasi-experiments, and experiments.

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