Mazziotta, M., & Pareto, A. (2025). *Statistics for Composite Indicators*. Springer. 174 pp.
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Introduction

Matteo Mazziotta and Adriano Pareto's *Statistics for Composite Indicators* (Springer, 2025) is a substantial and timely contribution to the literature on multidimensional measurement and composite index construction. The book is firmly situated within the "beyond GDP" agenda, which has gained prominence since the early 2000s as scholars and international organizations increasingly recognize the limitations of gross domestic product as a measure of social progress. While GDP remains a powerful indicator of economic activity, it fails to capture critical dimensions such as health, education, inequality, environmental sustainability, and subjective well-being.

In this context, composite indicators have emerged as influential tools for synthesizing complex phenomena into intelligible metrics. Yet their growing use has also sparked skepticism, particularly about their methodological transparency and normative assumptions. Mazziotta and Pareto directly confront this tension by offering a rigorous statistical framework paired with a reflective methodological stance. Rather than promoting a single "optimal" index, the authors emphasize principles of transparency, theoretical coherence, and robustness that should guide responsible indicator construction.

Part I: Definition of the Problem

The opening section of the book sets out the rationale for composite indicators while clearly acknowledging their risks. Mazziotta and Pareto argue that multidimensional phenomena, such as well-being or sustainability, cannot be adequately represented by isolated indicators. Composite indices offer a practical solution by reducing complexity and improving communication, especially for policymakers and the public.

At the same time, the authors warn that composite indicators can be misleading when methodological decisions are poorly justified. They invoke the well-known "garbage in, garbage out" principle, underscoring that statistical sophistication cannot compensate for weak conceptual foundations or low-quality data. This section effectively frames composite indicators as powerful yet potentially dangerous instruments, requiring methodological discipline and explicit justification at every step.

Part II: Theoretical Model

Part II emphasizes the centrality of theory to measurement. The authors argue that composite indicators are meaningful only to the extent that they faithfully operationalize a well-defined construct. They distinguish between reflective and formative measurement models, noting that most composite indices implicitly adopt a formative logic, in which indicators jointly constitute the phenomenon of interest.

This distinction has important implications for aggregation and weighting. Treating formative indicators as reflective can lead to methodological inconsistencies and invalid inferences. Mazziotta and Pareto's discussion provides valuable conceptual clarity and

serves as a corrective to data-driven approaches that prioritize statistical convenience over theoretical coherence.

Part III: Composite Indicator Construction

The methodological core of the book addresses normalization, weighting, and aggregation. The authors provide a critical review of common normalization techniques, including min–max scaling and z-score standardization, and highlight their respective advantages and limitations. They emphasize that normalization choices are never neutral, as they influence both the distribution and interpretation of results.

Weighting schemes are subject to particularly careful scrutiny. Mazziotta and Pareto caution against uncritical reliance on data-driven methods, such as principal component analysis, which may obscure the normative assumptions underlying apparent objectivity. Instead, they advocate transparent, theoretically justified weighting strategies.

When discussing aggregation, the authors distinguish between compensatory and non-compensatory approaches. They strongly favor non-compensatory methods in contexts where trade-offs between dimensions are normatively unacceptable, such as in sustainability or human development. Their Mazziotta–Pareto Index (MPI) operationalizes this philosophy by penalizing imbalance across dimensions.

Part IV: Applications

The application section demonstrates how composite indicators perform in empirical contexts. Through spatial and temporal analyses, the authors show that composite indices can reveal patterns of imbalance that are hidden in GDP-based assessments.

Applications to well-being, environmental sustainability, and development monitoring highlight the practical relevance of the MPI. Although the geographic scope is limited, the case studies demonstrate the added analytical value of non-compensatory composite indicators.

Review of Existing Indicators

Mazziotta and Pareto critically review prominent indices, including the Human Development Index (HDI), the OECD Better Life Index, and the Italian BES framework. While acknowledging their historical and policy significance, the authors identify methodological weaknesses, including excessive compensability and insufficient robustness analysis.

This comparative discussion reinforces the book's evaluative framework and positions the MPI as a methodological refinement rather than a wholesale rejection of current approaches.

Critical Evaluation and Implications

The book's principal strengths are its methodological rigor, conceptual clarity, and integration of theory and empirical application. Its insistence on transparency and robustness addresses many of the criticisms of composite indicators.

A user of this book would likely want references or examples of the following aggregation techniques omitted: Data Envelopment Analysis (DEA), Weighted Geometric Mean (not just Geometric Mean), DP2 by Pena-Trapero, and TOPSIS. A short list of other omissions or insufficient information includes:

• A detailed explanation of the Wroclaw method, explaining why it is unnecessary to reverse the polarity of negative indicators in this aggregation procedure.
• The potential use of standardization (z-scores) and normalization procedures for negative indicators to reverse their polarity in certain aggregation procedures.
• The potential use of standardization (z-scores) and normalization procedures for negative indicators to express distance to the ideal point in terms of proximity in the Wroclaw method.
• Mention the relationship between the Wroclaw method and TOPSIS (omitted).
• The absence of step-by-step sections and no Excel or SPSS commands requires additional effort from the user.
• Explain why the Wroclaw method is partially compensatory.
• Explain the difference between the Mazziotta-Pareto Index and the formula for the contraharmonic mean in Morrison (1973) and Lyerly (1974).

Nonetheless, the book has significant implications for academic research, official statistics, and policy analysis, and serves as a comprehensive reference for developing responsible composite indices.

Conclusion

Statistics for Composite Indicators stands as both a warning against careless index construction and a blueprint for rigorous measurement practice. By integrating epistemological reflection with statistical methodology, Mazziotta and Pareto make a lasting contribution to the measurement of multidimensional phenomena. The book will likely become a core reference in the field.

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