

TRB ABJ80 Committee on Statistical Methods
Draft Triennial Strategic Plan

TSP Three-Year Period: April 2018 to April 2021

Date Prepared: January 28, 2018

Committee ABJ80 (Statistical Methods) resides within the Policy and Organization Group (AB000), and Data and Information Systems Section (ABJ00) within TRBs Technical Activities

Committee Chair: Panagiotis Ch. Anastasopoulos (as of April 2018)

Committee Scope and Objectives

The following defines the scope of activities of ABJ80:

The ABJ80 Committee is concerned with the appropriate application of statistical and econometric methods in the field of transportation. The committee serves as a resource on statistical and econometric matters for all TRB committees and related committees for the National Academies; fosters understanding and use of statistics and econometrics through dissemination of educational activities; and identifies and fosters research needed in statistics and econometrics within the transportation community.

This scope translates to the following committee objectives:

1. Provide statistical and econometric methods education for TRB committees, members, and friends.
2. Broaden the influence of ABJ80 on the State of the Practice on Statistical and Econometric Methods to committees and members across TRB.
3. Raise awareness regarding the debates and discussions surrounding the merits and limitations of competing statistical and econometric methods applied in transportation research.
4. Identify connections between statistical and econometric methods and transportation applications within TRB.
5. Recognize significant contributions toward the advancement of statistical and econometric methods within TRB.
6. Promote implementation of state-of-the-art statistical and econometric methods within TRB.

Committee Strategic Plan and Focus Activities for 2018-2021

This committee will support traditional efforts and activities as well as identify new directions and outcomes, in the areas of education, research, and service.

- Statistical and Econometric Methods Education. The committee focuses on the education of statistical and econometric methods, tools, and data collection techniques that can help demonstrate the applications in the transportation area.
 - *TRB Circular/Fact Sheets*. This committee has produced a document that helps inform members of the TRB community on traditional and new statistical and econometric methods and software. This is an instrumental contribution of the committee (part of the 2015-2018 Triennial Strategic Plan), as many students, researchers and practitioners in transportation-related research areas are not sufficiently prepared in mathematics and statistics/econometrics to tackle complex analytical issues that arise in transportation, particularly with the ease to access large, complex, dynamic data sets. The committee will promote the document within TRB and the transportation community, will monitor advancements in statistical and econometric methods, will pursue feedback from the published

- document, and will update the document with new statistical and econometric methods and relevant software tools and practical applications.
- *TRB Data Contest.* As noted earlier, the advent of data that are complex and dynamic in nature fosters a need to identify and understand the statistical and econometric challenges associated with large datasets. Over the past six years (2012-2018), this committee has co-sponsored the TRB Data Contest and will continue to do so to help educate the transportation community on innovative statistical and econometric methods. This contest works best when co-sponsored with other committees as the datasets from different transportation areas bring unique challenges. Thus far, the datasets have included travel behavior, safety, driving simulator data and we will continue to seek out other datasets and committees to continue this contest.
 - *Invited sessions/workshops:* Since 2006, we have sponsored or co-sponsored an invited session or workshop that provides education on statistical and econometric methods to transportation practitioners, researchers, and students. We will continue to forward this mission as part of this committee. Past sessions have included topics on appropriate design of experiments, time-series modeling, Bayesian statistics, data imputation, and sample survey designs. Over the 2018-2021 period, we plan to have invited sessions/workshops on statistics and econometrics education (basic skills), and invited sessions/workshops on high-level applications of state-of-the-art statistical and econometric methods.
- Foster knowledge in statistical and econometric methods and software. The committee will foster public discussions on traditional (state-of-practice) and advanced (state-of-the-art) statistical and econometric methods, and use of appropriate statistical and econometric software tools that are within the committee scope. We will coordinate with committees that have an overlapping interest in these areas. For example, several potential topics tend to overlap with ABJ70 (Artificial Intelligence and Advanced Computing Applications) and ANB20 (Safety Data, Analysis and Evaluation), and this committee will work with these and other TRB committees to address appropriate topics. Specifically, the committee shall identify a list of topics that merit exploration by experts on the committee and affiliated with the committee that will serve broad TRB research interests. Potential topics include the following:
 - Methods that account for unobserved heterogeneity (e.g., random parameters, latent class, mixed generalized models, etc.).
 - Methods that account explicitly for time- and space-specific heterogeneity.
 - Methods that account for system of equations, multivariate modeling, and large dataset misspecifications (e.g., endogeneity, cross-equation error correlation, panel effects, etc.).
 - Understanding the statistical and econometric model ‘building’ process, including appropriate assumptions and effective model estimation.
 - Goodness-of-fit and forecasting accuracy measures, particularly with regard to model testing and selection.
 - Appropriate use of traditional, empirical Bayesian, and full Bayesian methods.
 - Practical use of state-of-the-art statistical and econometric methods, including implementation and application techniques for real-life problems.
 - Open source tools for statistical analysis (R, Python, data toolbox, Matlab/Octave).
 - Research in Statistical and Econometric Methods. Emerging research areas in transportation seem to drive the research community to focus – nearly exclusively – in autonomous and connected vehicles initiatives. Traditional transportation research, however, should not be neglected, as the timeline for the practical use of autonomous and connected vehicles in any scale is uncertain. At the same time, a plethora of

sensors has become available for transportation research, which allows capturing massive data at millisecond levels and lower, and results in the development of large datasets. These three areas involve inherent model misspecification issues (unobserved heterogeneity, large dataset effects, etc.) which this committee can help the transportation community address. Thus, along these three pillars (autonomous and connected vehicles, traditional transportation research, and large dataset challenges), this committee we will develop research need statements that can be considered by state agencies as well as at a national level.

- Provide statistical and econometric consultation/reviews for other TRB committees. The committee will continue to grow the breadth of membership and cooperation across TRB by providing statistical and econometric services to the TRB community. This includes TRB paper reviews for other TRB committees whose members may not have as extensive a knowledge of statistical and econometrics tools and methods. We will also continue to engage in co-sponsorship of sessions with a range of committees.
- Broaden the influence and connection of ABJ80 across TRB. The committee will continue to grow its breadth of membership reach and cooperation across TRB. This committee's original focus was on road safety analysis. However, advanced statistical and econometric methods transcend many transportation research fields, and have encouraged membership from other transportation areas, such as pavement and materials, freight, transport planning, travel behavior, survey methods, and non-motorized travel. ABJ80 has been and continues to be a diverse committee representing broad research interests united by a common passion for statistical and econometric methods. Because statistical and econometric methods are ubiquitous across TRB committees, the 'reach' of the ABJ80 committee has not been fully exploited. This fosters the need to co-sponsor sessions with committees that we have not previously collaborated with. We will continue to identify new activities that ABJ80 can engage in within TRB (invited presentations, summer meetings, supporting a conference, etc.).
- Provide recognition for significant contributions in statistical and econometric methods. The committee will continue to recognize contributions to the advancement of statistical methods in TRB. The specific strategic goals are to: (a) Continue to recognize papers each year submitted to TRB for their excellent contribution to statistical methods applied in transportation research; and (b) to have ABJ80 award winners move forward to receive a TRB-wide awards.

Committee History

ABJ80 began with informal discussions at the 1990 TRB annual meeting, which led in 1991 to the formation of task force A3T51: Task Force on Statistical Methodology, as part of TRB's Group 3: Operation, Safety, and Maintenance of Transportation Facilities. The discussions and task force were led by Olga Pendleton (independent consultant), who became the founding Chair. In 1996, the task force became a TRB committee (A5011: Committee of Statistical Methodology and Statistical Software in Transportation Engineering) within TRB's Group 5: Intergroup Resources and Issues. In 2004, under Simon Washington as the presiding ABJ80 chair and with the TRB's reorganization, the committee was renamed to ABJ80: Statistical Methods.

When the committee was founded, it was focused on statistical methods in all areas or transportation. However, the majority of research and make-up of the committee was related to safety and therefore, focused on exposure metrics in road safety analyses. Under Olga Pendleton, the committee remained focused on road safety modeling, with specific focus on metrics of exposure and the statistical modeling of road safety data. After Olga's two terms as committee Chair, Michael Griffith (currently at FHWA) took over as committee Chair for

another two terms, followed by Simon Washington (currently at University of Queensland) for two terms, followed by Linda Ng Boyle (currently at University of Washington). The committee Chair as of 2018 is Panagiotis Ch. Anastasopoulos (currently at University at Buffalo, The State University of New York).

Michael Griffith broadened the focus on safety methods by increasing the scope of the committee and addressing other analytical methods in safety, including artificial intelligence, heuristic methods, and generalized linear modeling of crash data. The focus still remained on safety analyses, and the membership still included well over 90% academics who focused on safety research.

Simon Washington then broadened the interest of the committee to include topical areas outside of motor vehicle safety. He accomplished this through broad session activities and co-sponsorships, as well as the inclusion of non-safety focused researchers and non-academics to the committee. As of 2012, the committee membership shifted to approximately half with a safety focus, and the other half from a wide range of topical areas including pavements and materials, traffic, transport planning, survey methods, and non-motorized travel.

Linda Ng Boyle sustained the broad focus of the committee on various transportation areas (safety, travel behavior, artificial intelligence, traffic, infrastructure and pavements, etc.), and shifted the focal point of the committee on the application of statistical methods by the TRB and transportation community. This was achieved through the publication of the *TRB Circular* document, through a number of significant co-sponsorships of presentation sessions with other TRB committees, and through the summer meetings at and partnership with the Joint Statistical Meetings of the American Statistical Association. She also brought into the committee diversified ideas and capabilities, by inviting and offering committee membership to underrepresented populations in the field.