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EDITED AND REVIEWED BY
Peter David Tolmie,
University of Siegen, Germany

*CORRESPONDENCE
Tuba Bircan
✉ tuba.bircan@vub.be

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Editorial: New methodological approaches for migration and mobility studies: from traditional to big data

Tuba Bircan^{1*} and Haodong Qi²

¹Vrije University Brussels, Brussels, Belgium, ²Malmö Universitet, Malmö, Sweden

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Editorial on the Research Topic

New methodological approaches for migration and mobility studies: from traditional to big data

Research on migration and mobility is undergoing a methodological transformation. Big data and computational techniques are increasingly used to study flows, integration, and governance. However, the contributions to this Research Topic collectively remind us that novelty alone does not guarantee robustness. Unlike official statistics and other traditional data sources, big data may only reflect the behavior of a self-selected subset of the population, raising concerns about its generalizability and representativeness (Qi et al., 2025). What may make new approaches scientifically sound is their calibration against reliable ground truth, rigorous interpretation, and institutions enabling the verification and reproducibility of findings. Calibration, in this sense, is not a peripheral safeguard but rather the practice that translates methodological innovation into credible knowledge.

From experimentation to evaluation

In their article, Nalbandian and Dreher provided a comprehensive review of advanced digital technologies in migration management. They charted the growing use of biometrics, artificial intelligence, mobile analytics, and drones across different regions and governance domains. Their analysis exposes a striking gap: while technological experimentation is widespread, systematic technical evaluation is rare. Descriptive accounts dominate, particularly in high-stakes domains such as border surveillance and asylum processing. Without calibration against independent benchmarks, the risk is techno-solutionism, policies justified by tools whose performance is neither transparent nor reproducible. The review calls for deeper scrutiny, interdisciplinary collaboration, and attention to the power asymmetries that shape how technologies are deployed.

While Nalbandian and Dreher highlighted the risks of under-evaluation, Umel showed how calibration can also be interpretive. Combining topic modeling with ethnographically informed qualitative analysis and grounding both in social representations theory, the study examined Filipino migrants' Facebook exchanges in Germany. Rather than treating automated topics as answers, the study positions them as pointers requiring contextual interpretation. This reflexive design demonstrates that calibration is not limited to

statistical benchmarking but also involves anchoring computational outputs in theory and meaning. In multilingual and culturally dense settings, validity arises not from scale but rather from aligning methods with lived realities.

Kondyli et al. reminded us that calibration is not only a methodological practice but also an infrastructural achievement. Using the SoDaNet repository in Greece as a case study, the authors showed how rigorous documentation, anonymization, versioning, and persistent identifiers enable secondary analysis and replication. Their demonstration of “secondary added value” highlighted how indices, replications, and derivative datasets themselves become future benchmarks. Thus, calibration depends on more than individual diligence: it requires repositories and infrastructures that embed transparency and reusability in the architecture of migration research. This echoes broader calls for FAIR data principles to become operational realities rather than aspirational slogans.

Ahmad Yar and Bircan provided a state-of-the-art synthesis on the role of big data in migration statistics. They demonstrated that digital traces, social media activity, mobile phone records, and satellite imagery have genuine strengths in timeliness and granularity and have advanced nowcasting, short-term mobility mapping, and integration research. However, the value of these innovations lies not in isolated applications but rather in systematic approaches that combine computational methods with established demographic infrastructures (Salah et al., 2022). Nevertheless, persistent weaknesses remain: digital divides, unstable denominators, limited access to proprietary data, and a lack of detailed demographic information about migrants. Their conclusion is clear. Big data has scientific value not in isolation but when it is triangulated with registers, surveys, and administrative data, and when models are validated against credible counterfactuals. Calibration is thus the route from experimental innovation to policy relevance.

Toward a calibration agenda

When considered as a whole, the contributions to this Research Topic point to a shared agenda for methodological progress. First, validation against trusted benchmarks is a must, not an optional add-on. These benchmarks continue to rely on long-standing instruments such as censuses, registers, and household surveys, which remain the backbone of official migration statistics worldwide (United Nations, Department of Economic and Social Affairs, Population Division, 2020). Without systematic comparison to such sources, computational estimates remain largely uncertain and questionable. Second, reflexivity must be treated as integral to calibration. Automated analyses of online discourse or mobility traces cannot stand alone; they must be anchored in theoretical and contextual interpretation to avoid decontextualization or cultural misinterpretation. Third, infrastructures for documentation and reuse are essential to making calibration sustainable and turning individual good practices into collective scientific standards. Infrastructures

such as repositories, metadata systems, and replication protocols can extend calibration from a scholarly habit to a field-wide norm.

While big data has the potential to advance migration research, it cannot replace traditional sources. A full transition “from traditional to big data” is neither feasible nor desirable. What emerges instead are complementary methodological innovations; traditional sources continue to offer comparability, demographic depth, and legal anchoring. Meanwhile, big data sources provide timely and granular information, enabling deeper insights into the spatiotemporal patterns of human mobility. Qualitative and participatory approaches, on the other hand, add context, ensuring that numerical findings are interpretable. Calibration is the practice that holds these strands together through adaptive statistical frameworks that can integrate prior knowledge into statistical analyses, mandates for sharing code and metadata, thus ensuring reproducible numerical findings, and ethics-by-design protocols that protect individuals while allowing verification.

Concluding reflections

The calibration process proposed here by no means intends to address all aspects of limitations and challenges in migration research. Some populations will remain difficult to observe, and some data will remain inaccessible, leading to incomplete adjustments for sample selection and other biases. However, the lesson from this Research Topic is clear. When new and traditional sources are aligned, findings become more credible, contestable, and reusable. This is the path by which methodological innovation strengthens not only predictive accuracy but also the evidentiary basis for informed public debate on migration. The challenge now is to make calibration a common practice: not an afterthought, but a shared standard for research that aspires to shape policy and scholarship alike.

Author contributions

TB: Conceptualization, Funding acquisition, Supervision, Validation, Writing – original draft, Writing – review & editing. HQ: Conceptualization, Validation, Writing – original draft, Writing – review & editing.

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