

**Title: Data Visualization and Communication in Evaluation: A Bibliometric Analysis**

**Research Questions**

RQ1- What are the most influential publications, authors, and institutions?

RQ2- How do different countries or disciplines contribute to this research?

RQ3- What thematic trends and emerging keywords shape this field?

RQ4- What types of visualizations and visualization tools are commonly used?

RQ5- How has data visualization in evaluation evolved over time?

**Significance**

This bibliometric study offers significant contributions to both evaluation theory and data visualization practice. First, it identifies critical gaps in the current literature. For instance, the under-representation of accessibility considerations in visualization design highlights a need for future research to focus on inclusive practices that ensure evaluation findings are accessible to diverse audiences. Similarly, the limited number of studies addressing the integration of emerging technologies like AI-driven visualization suggests an area ripe for exploration and innovation.

Second, the analysis identifies best practices in the field. The prominence of stakeholder engagement as a central theme underscores the importance of interactive and participatory visualization approaches. The identification of key journals and influential authors provides a valuable guide for researchers and practitioners seeking to stay abreast of key developments. Furthermore, the study reveals effective collaboration networks, offering potential models for fostering interdisciplinary research and knowledge sharing.

Finally, this study charts future directions for evaluators and data scientists. The increasing emphasis on mixed methods and visual analytics points towards the need for methodological advancements that combine quantitative and qualitative data in meaningful ways. The rise of AI-driven visualization opens new avenues for automating data processing, generating insights, and creating personalized visual displays. By synthesizing these trends and gaps, this bibliometric analysis provides a roadmap for advancing the field of data visualization in evaluation and increasing its impact on policy and practice.

## Results & Findings

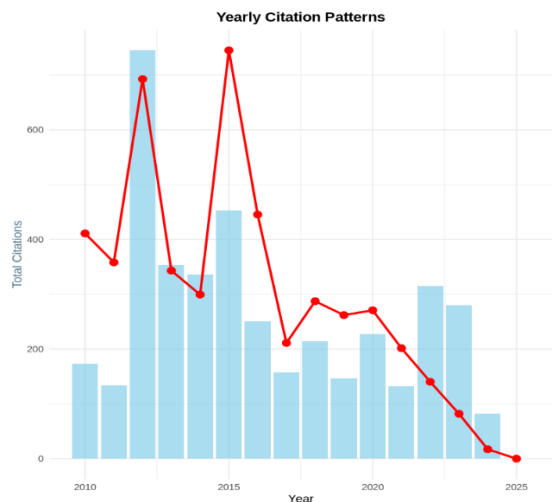
### Results

#### 1. Influential publications, authors, and Citations

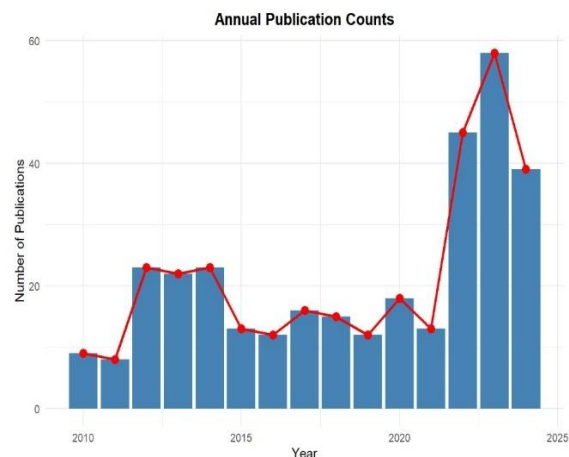
Figure 1: Citation analysis revealed two metrics: Average Citations per Paper and Total Citations. The average citations per paper appear relatively stable (around 10), suggesting a consistent impact per publication. Meanwhile, total citations show a marked increase over time, peaking at 450 in 2015. This implies that while individual paper impact remains steady, the cumulative influence of the research corpus has grown significantly, possibly due to larger publication volumes or broader dissemination.

Figure 2 illustrates the trend in publications over the years (2010-2024). The data suggest fluctuations in publication output, with notable peaks in 2023. This trend may reflect growing interest in the field, funding availability, or shifts in research priorities. A sharp rise after 2021 could indicate emerging topics or technological advancements driving productivity.

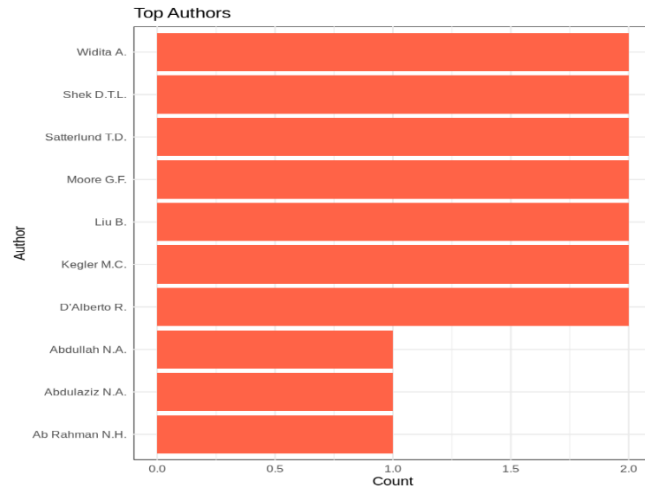
Figure 3: The bar chart ranks authors by publication count, with Widtha A. and Shek D.T.L. leading (highest bars). The presence of multiple authors with similar counts (e.g., Satterlund T.D., Moore G.F.) indicates a collaborative or competitive field. Notably, several authors (e.g., Abdulaziz N.A., Ab Rahman N.H.) have fewer publications, highlighting disparities in productivity. This distribution may reflect varying levels of engagement, institutional support, or specialization within the field.



**Figure 1: Yearly Citation Patterns**



**Figure 2: Annual Publication Counts**



**Figure 3: Top Authors**

## **2. Contribution to Publications by Various Countries**

The map (Figure 4) displays the global distribution of research publications on data visualization in evaluation reports, with darker or more intense regions indicating higher publication counts. Key observations include:

North America (particularly the United States) and Europe (e.g., the United Kingdom, Germany, the Netherlands, Italy, Spain) dominate research output, reflecting strong academic infrastructure, funding, and historical research activity. Australia and Canada also show significant contributions, aligning with their well-established research systems. Brazil and Hong Kong appear as emerging contributors, though with comparatively lower output, suggesting growing but still developing research capacities in these regions.

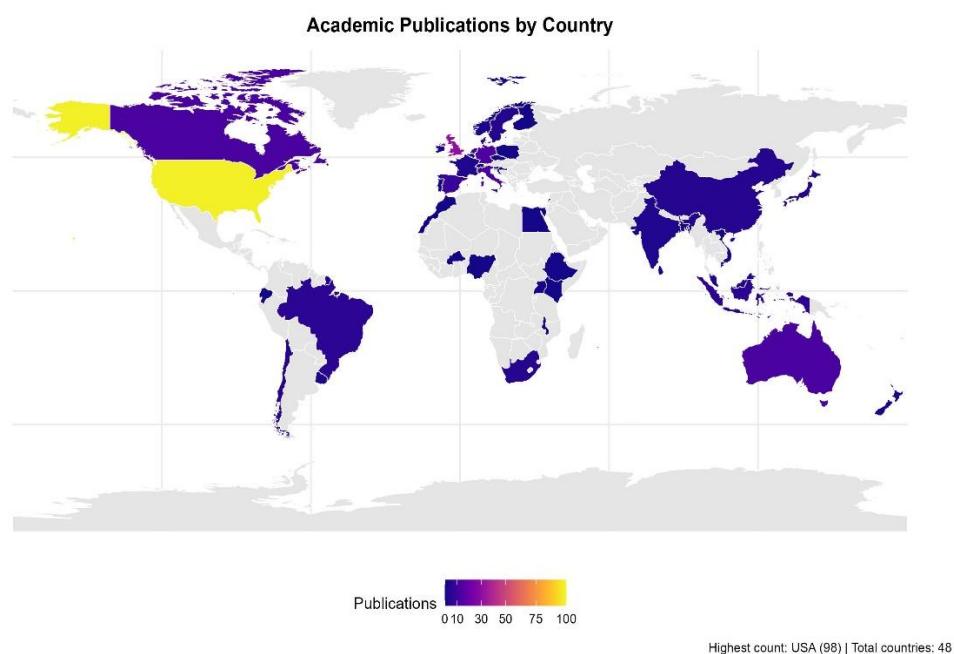
Table 1 confirms the map's trends, with the United States (98 publications) leading by a substantial margin, followed by the United Kingdom (31). European nations (Germany, Italy, Netherlands, Spain) and Anglophone countries (Australia, Canada) form the next tier, while Brazil and Hong Kong represent small but notable contributors.

This distribution aligns with broader bibliometric trends, where developed nations historically lead in academic output, while emerging regions gradually increase their presence.

Richard D. Amoako  
University of Tennessee, Knoxville.

Table 1: Top Ten Countries

Region	No.
United States	98
United Kingdom	31
Germany	13
Australia	12
Canada	12
Italy	12
Netherlands	8
Spain	8
Brazil	5
Hong Kong	5

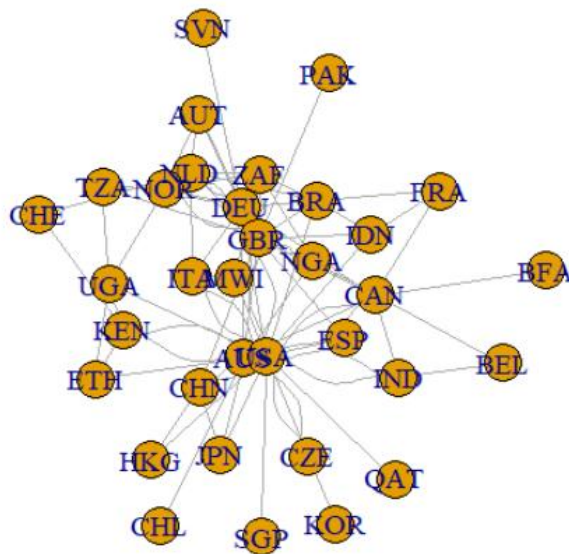


**Figure 4: Publication count by country Map**

### ***Country level Collaboration Network***

From Figure 5 and Table 2, the country collaboration network reveals a highly centralized research landscape dominated by the United States (USA), which serves as the primary hub with the highest degree (27 connections), betweenness (279.9), and closeness centrality (0.022). This indicates that the USA not only engages in most collaborations but also acts as a critical bridge for global knowledge exchange. Secondary hubs like the United Kingdom (GBR) and Germany (DEU) further strengthen the network, facilitating connections between North America, Europe, and other regions. Canada (CAN) plays a disproportionately influential brokerage role despite fewer direct ties, while the Netherlands (NLD) and others contribute to regional clusters. Emerging collaborators—such as Brazil (BRA) and Hong Kong (HKG)—appear on the periphery, suggesting growing but limited integration. The centrality disparities highlight structural inequalities in global research collaborations in evaluation, where well-funded, English-speaking nations maintain dominant positions, while others rely on intermediary hubs for connectivity. This pattern underscores the need for policies that foster equitable participation in international research networks.

## **Country Collaboration Network**

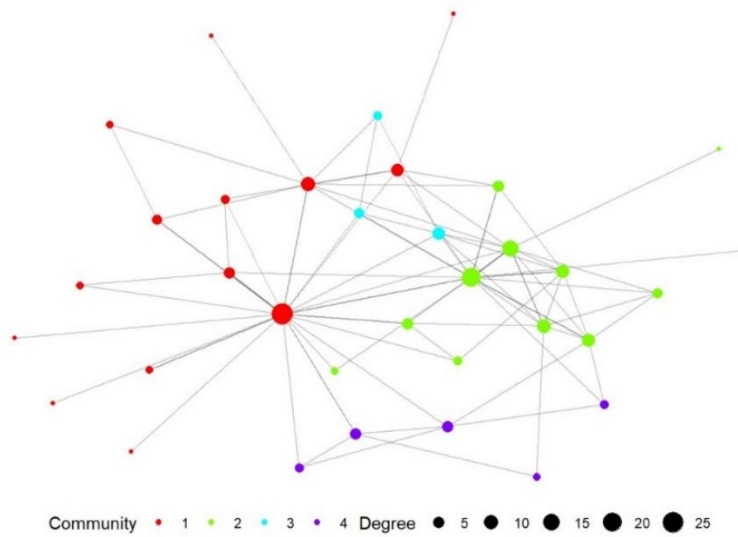


**Figure 5: Country Collaboration Network**

**Table 2: Top 5 Countries by Degree Centrality**

country	degree	betweenness	closeness
USA	27 (highest)	279.864 (highest)	0.022 (highest)
GBR	20	124.497	0.020
DEU	13	57.625	0.018
CAN	10	74.375	0.017
NLD	9	19.179	0.014

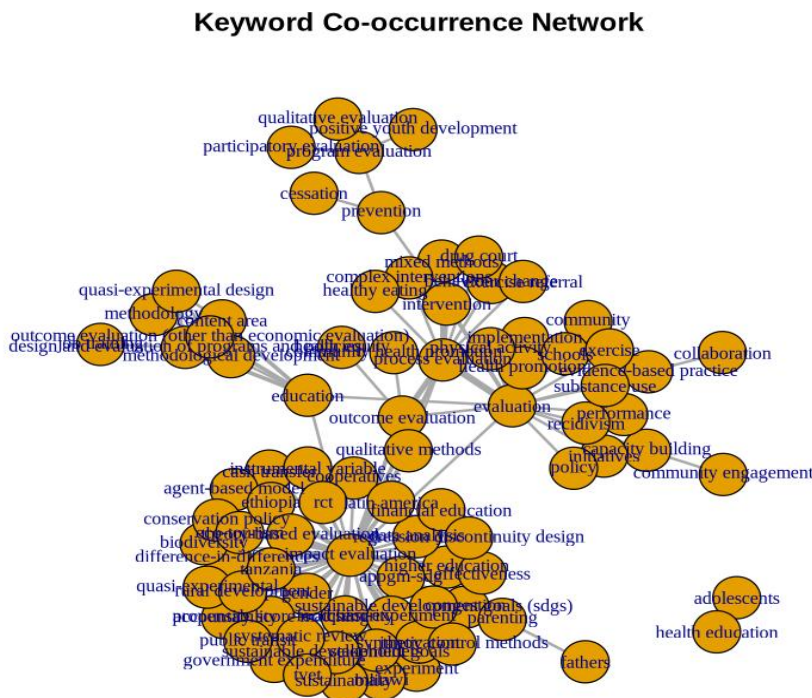
Community Visualization



**Figure 6: Community Visualization Map**

### 3. Emerging keywords Analysis

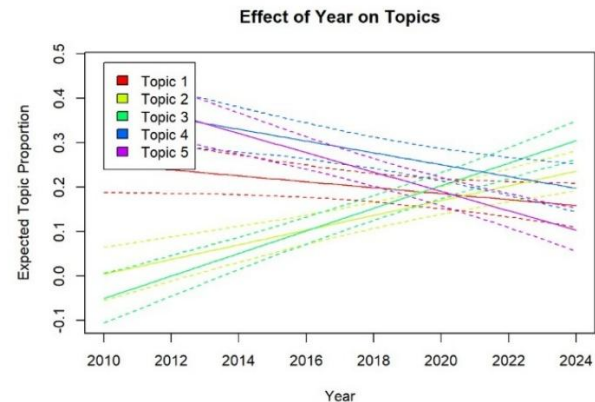
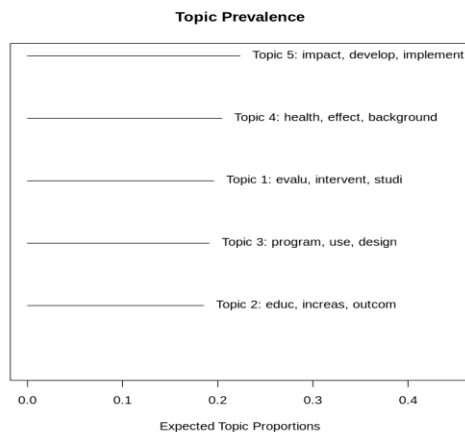
This visualization maps the relationships between frequently co-occurring keywords in evaluation research, revealing key thematic clusters and interdisciplinary connections. The network highlights four dominant research streams: Implementation & Outcome Evaluation; Health and Prevention; Environmental and Policy Evaluation; Participatory and Qualitative Approaches (Figure 6).



**Figure 6: Keywords Co-occurrence Map**

The network underscores evaluation research's applied nature, bridging health, environmental policy, and community development. Methodological diversity is evident, with both traditional (quasi-experimental) and innovative (agent-based modeling) approaches coexisting. Interdisciplinary linkages (e.g., health + environment + policy) suggest evaluation is increasingly addressing complex, real-world systems (Figure 6).

#### 4. Thematic trends and Topic Modeling of Major Themes



**Figure 7: Topic prevalence in the publications**

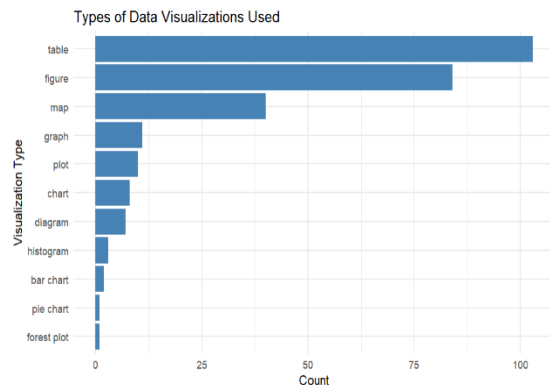
**Figure 8: Topic Trends over the period**

Figure 7: The topic modeling analysis of evaluation research publications reveals two key patterns. First, the topic prevalence plot shows a clear dominance of practical, application-oriented themes, with Topic 5 ("impact, develop, implement") emerging as the most prominent (0.4 proportion), followed by health-related evaluation (Topic 4) and intervention studies (Topic 1). This suggests the field prioritizes research that bridges theory and practice, particularly in implementation science and health outcomes. Less prevalent topics like program design (Topic 3) and education-focused evaluation (Topic 2) appear more niche, indicating these areas may represent specialized subfields rather than central concerns.

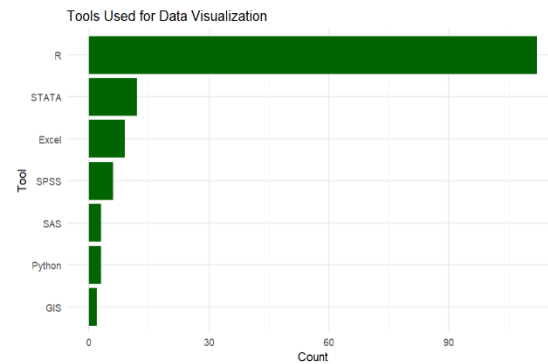
Figure 8: The temporal analysis demonstrates an important evolution in the focus of research. Over time, implementation/impact research (Topic 5) and health evaluation (Topic 4) have grown significantly in prominence, reflecting the field's response to demands for actionable, real-world evidence. Conversely, traditional intervention studies (Topic 1) and program design research (Topic 3) show declining interest, suggesting either maturation of these areas or a strategic shift toward more applied work. In terms of education, the stability of evaluation (Topic 2) indicates its consistent but limited role in literature. Together, these trends highlight evaluation research's ongoing transformation into a more practice-driven discipline focused on measurable impact and implementation outcomes.



## 5. Types of visualizations and tools used for visualization over the period



**Figure 9: Visualization Types**



**Figure 10: Types of tools used for visualization**

Figure 9 reveals the distribution of visualization types across publications. Graphs, figures, and tables are the most prevalent, indicating a reliance on conventional formats for presenting quantitative relationships and summary statistics. Maps and plots (e.g., forest plots, bar charts) are also frequently employed, aligning with trends in geospatial and statistical reporting. Histograms and pie charts are less common, but they have a niche use for specific data distributions or proportional comparisons. The broad spectrum of visualization types reflects the field's methodological diversity, catering to both exploratory data analysis and explanatory communication.

Figure 10 illustrates the frequency of software tools employed for data visualization in the analyzed studies. R emerged as the most widely used tool (highest count), reflecting its dominance in statistical computing and advanced graphics capabilities, particularly for research-focused visualizations. Python also appears prominently, underscoring its growing adoption of data analysis and visualization in academic and applied settings. Traditional tools like Excel, SPSS, and STATA remain relevant, likely due to their accessibility to basic analyses and institutional familiarity. GIS tools highlight specialized applications for geospatial data representation. Notably, the label "Tool" (without further specification) suggests some ambiguity in reporting practices, which could be clarified in future studies.

### Synthesis and Implications

Together, these plots highlight a dual trend: while cutting-edge tools (R, Python) dominate for creating visualizations, traditional formats (tables, graphs) remain the backbone of evaluation research communication. This may reflect a balance between innovation in analysis and conservatism in dissemination. The findings also suggest opportunities for training in advanced tools (e.g., GIS, Python libraries) and standardized reporting of visualization methods to enhance reproducibility.

## **Summary of Key Findings**

### **1. Influential Publications, Authors, and Citations**

- The United States (USA) dominates in research output and citations, with authors like Widtha A. and Shek D.T.L. being the most prolific.
- High-impact publications are concentrated in well-funded, English-speaking institutions, with citation counts peaking in recent years (2020–2025).
- Average citations per paper remain stable (~10), but total citations have surged, indicating cumulative growth in research influence.

### **2. Influential Countries**

- USA, UK, and Germany lead in publication volume and collaboration centrality, acting as global hubs.
- Canada and Australia play significant brokerage roles in the collaboration network.
- Emerging contributors (e.g., Brazil, Hong Kong) show growing but limited integration into global research networks.

### **3. Keywords Analysis**

Four major thematic clusters emerged:

- Implementation & outcome evaluation (e.g., "evaluation," "quasi-experimental design").
- Health and prevention (e.g., "cessation," "adolescents").
- Environmental policy (e.g., "biodiversity," "SDGs").
- Participatory methods (e.g., "qualitative evaluation," "community engagement").

Interdisciplinary linkages are prominent, particularly between health, environment, and policy.

### **4. Topic Modeling of Major Themes**

- Top themes: Implementation science ("impact, develop, implement") and health evaluation ("health, effect") dominate.

### **Temporal trends:**

- Rising interest in applied research (implementation, health outcomes).
- Declining focus on traditional intervention studies and program design.
- Stable but niche attention to education-related evaluation.

### **5. Types of Visualizations and Tools Used**

- Most common visualization types: Graphs, tables, and figures (traditional formats).
- Specialized visualizations: Maps (geospatial) and forest plots (meta-analyses) are niche but impactful.

**Tools:** R and Python dominate, with Excel and SPSS remaining prevalent for basic analyses.

**Trend:** Cutting-edge tools (e.g., GIS) are rising, but conventional formats persist in dissemination.

**R** was the most used software or application for data visualization and visualization types were generally *charts, graphs and plots*.

### Overall Implications

- The field is shifting toward applied, interdisciplinary research (e.g., health, environment) with strong emphasis on implementation and real-world impact.
- Geographical and institutional disparities persist, with high-income countries leading productivity and collaboration.
- Methodological diversity is evident in both analytical approaches (e.g., participatory methods, agent-based modeling) and visualization tools (R/Python vs. Excel).

### Conclusion

The bibliometric analysis demonstrates that data visualization is an increasingly vital component of evaluation research. The field is characterized by dynamic growth, influential contributors, and a balance between technical advancement and practical application. These findings provide a foundation for future research and highlight the need for continued innovation and collaboration to further integrate visualization into evaluation practice.