

## Science Mapping and Performance Analysis of Restaurant Research: Evidence from the Web of Science Database

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**Abstract:** This study presents a comprehensive bibliometric analysis of restaurant research published between 2004 and 2024, based on 411 records retrieved from the Web of Science (WoS) database. The objective is to explore the intellectual structure, research trends, and collaboration patterns shaping the evolution of restaurant-related scholarship over the past two decades. Using performance analysis and science mapping techniques, the study identifies prolific authors, influential journals, leading institutions, and dominant countries contributing to this field. Data visualization and mapping were conducted using VOSviewer software to generate co-authorship, co-citation, and keyword co-occurrence networks.

Results reveal a significant increase in publication output after 2015, indicating growing academic interest in restaurant-related issues. The United States, China, and the United Kingdom emerged as the most productive countries, while the *International Journal of Hospitality Management* and *Cornell Hospitality Quarterly* were identified as the leading publication outlets. The most frequent keywords include *customer satisfaction*, *service quality*, *consumer behavior*, *sustainability*, and *technology adoption*. The findings contribute to understanding the evolution of restaurant research, highlighting emerging themes such as digital transformation, sustainability, and consumer experience that will shape future studies in the domain.

**KEYWORDS:** Restaurant research; bibliometric analysis; science mapping; performance analysis; VOSviewer; Web of Science; co-authorship; co-citation; keyword co-occurrence; citation, bibliographic - coupling hospitality management etc.

### 1. INTRODUCTION:

The restaurant industry forms a vital component of the global hospitality and tourism sector, contributing substantially to employment, revenue generation, and social development. Restaurants not only fulfill basic human needs for food and social interaction but also play a pivotal role in shaping cultural experiences, destination attractiveness, and consumer satisfaction. Over the past two decades, restaurant research has undergone significant evolution, encompassing diverse aspects such as service quality, consumer behavior, technology integration, sustainability, innovation, and organizational performance.

As the restaurant industry continues to evolve amidst globalization, digital transformation, and post-pandemic recovery, scholarly interest in understanding its dynamics has expanded remarkably. Researchers have investigated a wide spectrum of themes, ranging from operational efficiency and customer relationship management to the adoption of digital technologies like online food delivery platforms and AI-based services. Moreover, sustainability and green practices have emerged as key areas of focus, reflecting growing societal concern for environmental responsibility within foodservice operations.

Despite the growth in research output, there remains a lack of systematic understanding of the intellectual structure, influential contributors, and thematic evolution of restaurant research. Traditional literature reviews, while informative, often fail to capture the full extent of scholarly interactions and knowledge networks that shape the field. In contrast, bibliometric analysis offers a quantitative and objective approach to examining publication patterns, identifying influential authors and journals, and mapping the relationships among concepts and contributors.

This study integrates performance analysis and science mapping to provide a comprehensive overview of restaurant-related research published between 2004 and 2024, as indexed in the Web of Science (WoS) database. The use of VOSviewer software allows visualization of bibliometric networks including co-authorship, co-citation, and keyword co-occurrence, thereby uncovering intellectual linkages and research frontiers.

By analyzing 411 publications, this study aims to answer key questions: How has restaurant research evolved over time? Who are the leading contributors? What are the core themes and emerging topics? Addressing these questions will provide valuable insights for researchers, practitioners, and policymakers interested in understanding the knowledge landscape and guiding future research in restaurant studies.

### **OBJECTIVES OF THE STUDY:**

The present study seeks to achieve the following objectives:

1. To analyze publication and citation trends in restaurant research from 2004 to 2024.
2. To identify the most prolific authors, journals, institutions, and countries contributing to restaurant-related literature.
3. To examine patterns of scholarly collaboration through co-authorship and bibliographic coupling analysis.
4. To explore the intellectual and conceptual structure of restaurant research using co-citation and keyword co-occurrence networks.
5. To identify emerging themes and future research directions that reflects the evolution and transformation of restaurant research over the past two decades.

### **3. METHODOLOGY:**

#### **3.1 Research Design**

This study adopts a bibliometric research design that integrates performance analysis and science mapping to systematically evaluate the structure, productivity, and intellectual patterns of restaurant-related research. Performance analysis measures the quantitative aspects of scientific output, such as publication count, citations, and impact indicators, while science mapping visually explores the relationships among authors, institutions, journals, and key research themes.

#### **3.2 Data Source and Search Strategy**

The data for this study were extracted from the Web of Science (WoS) Core Collection, one of the most reputable and comprehensive databases for high-quality academic publications. The search was performed and the query string used was:

$TS = ("restaurant")^*$

This search was limited to publications within the time span of 2004–2024 and filtered for document types including *articles* and *review papers* to ensure the inclusion of peer-reviewed scholarly work. Language publications were considered to maintain consistency and readability.

After the initial search, irrelevant records (such as those not directly related to restaurant management or operations) were manually excluded. The final dataset consisted of 411 publications, which formed the basis for all subsequent analyses.

### 3.3 Data Extraction and Preparation

All bibliographic data, including titles, authors, affiliations, abstracts, keywords, source titles, citation counts, and funding agencies, were exported from the Web of Science in two formats:

- Plain text (.txt) — for importing into VOSviewer.
- Excel (.xls/.csv) — for data tabulation and performance analysis in Microsoft Excel.

Before analysis, the data were cleaned to remove duplicates, inconsistencies in author names, and incomplete records. This preprocessing ensured the accuracy of the visualization and mapping results.

### 3.4 Analytical Tools

Two main software tools were used in this research:

1. **MicrosoftExcel:**  
Used for descriptive and performance analysis, including annual publication trends, citation statistics, country productivity, and top journals.
2. **VOSviewer:**  
Used for science mapping to generate network visualizations for the following relationships:
  - Co-authorship analysis (authors, institutions, and countries)
  - Co-citation analysis (authors and sources)
  - Bibliographic coupling (documents, countries, and journals)
  - Co-occurrence analysis (keywords)

Each visualization map was generated based on the *Total Link Strength (TLS)* criterion, which indicates the strength of relationships among the nodes in the network.

### 3.5 Bibliometric Indicators

The following key indicators were used to evaluate research performance:

| Indicator                     | Description   |
|-------------------------------|---|
| TP (Total Publications)       | Number of published documents in the dataset.                               |
| TC (Total Citations)          | Total number of citations received by all publications.                     |
| CPP(Citations perPublication) | Average number of citations per article (TC/TP).                            |
| TLS (Total Link Strength)     | Represents the strength of collaboration or connection in mapping analysis. |

These indicators were used to assess both individual and institutional research performance.

### 3.6 Visualization and Mapping Process

Using VOSviewer, five types of maps were created to represent various aspects of the bibliometric network:

1. Publication Trends: Year-wise analysis of publication and citation growth.

2. Co-authorship Networks: Visualization of collaboration patterns among authors, institutions, and countries.
3. Co-citation Networks: Mapping of frequently cited authors and journals to identify intellectual foundations.
4. Keyword Co-occurrence Maps: Identification of thematic clusters and emerging research topics.
5. Bibliographic Coupling Maps: Analysis of similarity between documents, journals, or countries based on shared references.

Each network was displayed with nodes (representing items such as authors or keywords) and links (representing relationships). The node size indicates publication or citation volume, while link thickness represents the intensity of collaboration or co-occurrence.

### 3.7 Validity and Reliability

To ensure validity and reliability:

- The WoS database was selected for its high-quality indexing and citation tracking.
- Manual verification was performed to eliminate unrelated or duplicate records.
- Visual maps were cross-checked for consistency in cluster formation and network density.

### Summary:

This methodological framework enables a robust understanding of the performance metrics and intellectual structures in restaurant research. The integration of WoS data and VOSviewer visualization ensures both quantitative precision and qualitative insight into the evolution of this field.

## 4. Result, Findings and Discussion:

### 4.1 Performance Analysis

#### 4.1.1 Descriptive and performance Analysis of Publications

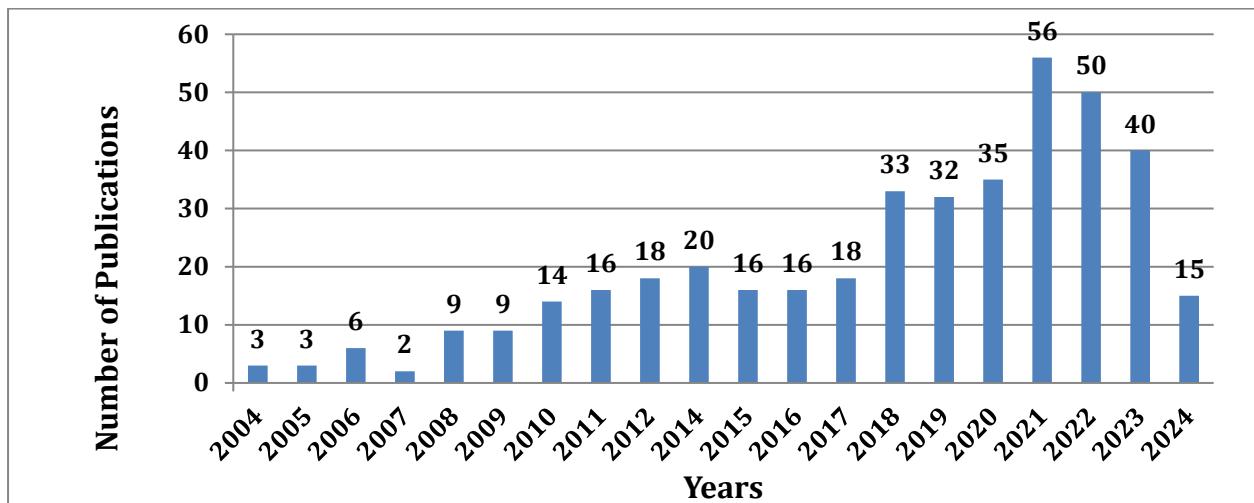
Figure 1 illustrates the annual growth of restaurant-related publications indexed in the Web of Science database from 2004 to 2024. The trend clearly reflects a consistent upward trajectory in scientific output over the two-decade period.

During the initial years (2004–2008), research activity in this domain was modest, with fewer than 10 publications annually, indicating that restaurant research was still in its formative stage. Between 2009 and 2015, publication counts began to rise steadily, averaging between 9 and 20 documents per year, suggesting growing scholarly recognition of restaurant management as a distinct research area within hospitality studies.

A notable surge in publications occurred after 2016, marking the period of rapid expansion in restaurant research. The field witnessed significant growth between 2018 and 2023, with publications peaking in 2021 (56 papers) — the highest within the entire study period — followed by 2022 (50 papers) and 2023 (40 papers). This increase coincides with global academic interest in topics such as post-pandemic recovery, digital transformation, and sustainable restaurant practices.

The decline in 2024 (15 publications) is likely due to the partial year of data collection, as the dataset was retrieved.

Overall, the trend demonstrates that restaurant research has experienced strong and sustained growth, evolving from a niche topic to an established field of inquiry within hospitality and tourism. The steady rise in scientific output highlights the increasing attention from researchers, practitioners, and policymakers toward issues related to restaurant performance, innovation, and consumer experience.



**Figure 1: Annual scientific production in restaurant research: Number of publications per year**

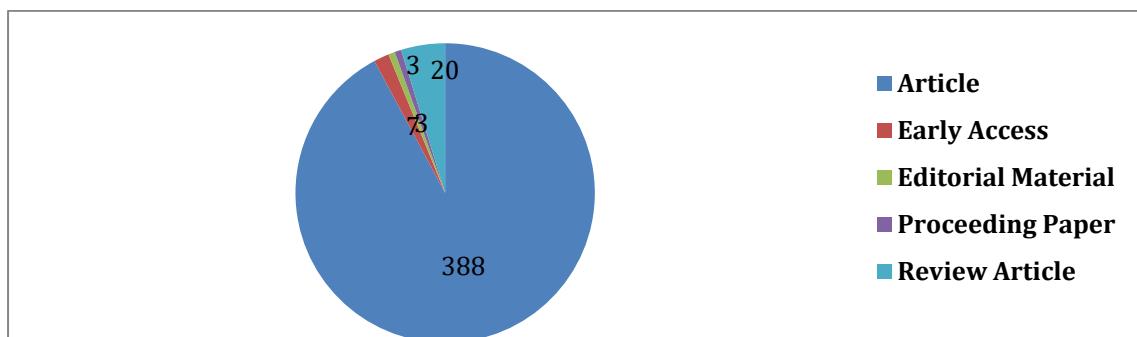
#### 4.1.2 Document Type Analysis

Figure 2 presents the distribution of different document types published in the field of restaurant research between 2004 and 2024. The results indicate that the majority of publications are research articles, accounting for 388 documents (94.4%) of the total 411 records analyzed. This dominance demonstrates that restaurant research primarily relies on empirical and theoretical studies published in peer-reviewed journals, reflecting the field's academic maturity and methodological rigor.

Review articles represent 20 publications (4.9%), signifying that a limited number of studies have synthesized existing knowledge or provided conceptual frameworks. This indicates an opportunity for future scholars to conduct systematic and integrative reviews that summarize and critically evaluate past research.

Other document types such as early access papers (7; 1.7%), editorial materials (3; 0.7%), and proceeding papers (3; 0.7%) collectively form a very small fraction of the total output. These typically serve as commentaries, pre-publications, or conference contributions, playing a minor yet supportive role in knowledge dissemination.

Overall, the results highlight that journal articles remain the dominant medium for scholarly communication in restaurant research, emphasizing the preference for evidence-based empirical studies over conceptual or editorial contributions.



**Figure 2: Distribution of document types in restaurant research**

#### 4.1.3 Distribution of Publications by Subject Area

Figure 3 displays the subject-area classification of restaurant-related publications indexed in the Web of Science database between 2004 and 2024. The analysis reveals that restaurant research is highly multidisciplinary, spanning various academic domains beyond traditional hospitality studies.

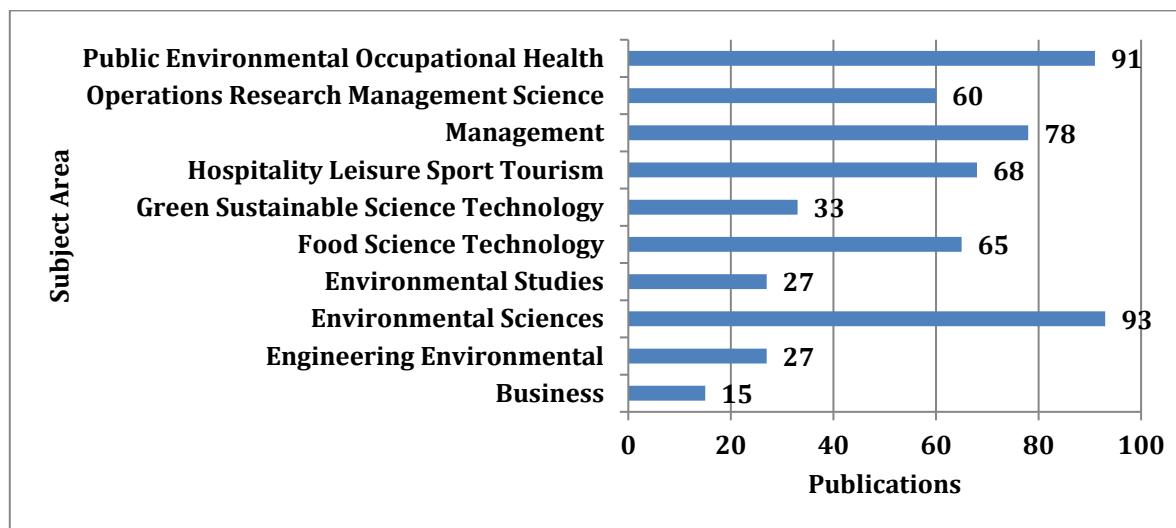
The highest number of publications falls under the Environmental Sciences (93) and Public, Environmental, and Occupational Health (91) categories, reflecting an increasing focus on sustainability, food safety, environmental health, and eco-friendly restaurant operations. This trend demonstrates the growing concern among scholars about environmental impacts and sustainable practices in the foodservice sector.

The Management (78) and Hospitality, Leisure, Sport & Tourism (68) subject areas also show strong representation, confirming the field's foundation in business management and hospitality disciplines. These studies primarily address issues such as service quality, customer satisfaction, restaurant performance, and strategic management.

Other significant contributors include Food Science & Technology (65) and Operations Research & Management Science (60), emphasizing the integration of technological innovation, operational efficiency, and quality control in restaurant operations. Meanwhile, emerging interdisciplinary fields such as Green and Sustainable Science & Technology (33) and Environmental Engineering (27) reflect the adoption of eco-innovation and waste management practices within restaurant research.

The Business (15) category, although smaller, indicates that a segment of restaurant-related research also focuses on entrepreneurship, consumer behavior, and business strategy.

Overall, this distribution highlights the diversity and cross-disciplinary nature of restaurant research, combining perspectives from environmental science, management, hospitality, and technology to address complex challenges in the modern restaurant industry.



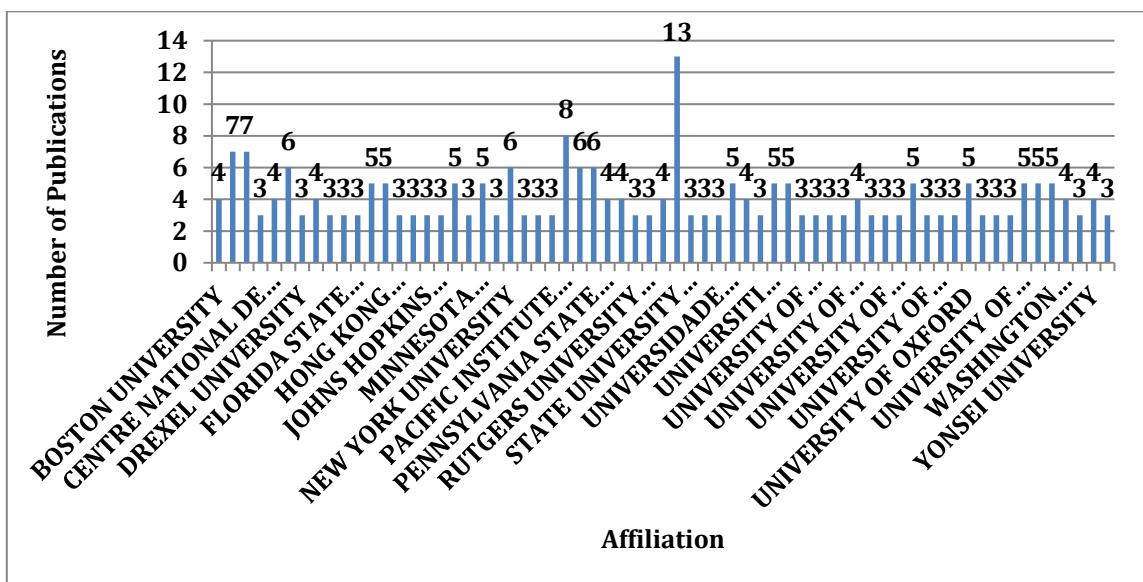
**Figure 3: Subject Area –wise Publication Output in Restaurant Research**

#### 4.1.4 Distribution of Publications by Affiliated Institutions

Figure 4 display bar chart visualizes the number of publications (y-axis, ranging from 0 to 14) from various academic and research affiliations (x-axis) in the field of restaurant research, highlighting the most productive contributors.

**Key Observations:**

- **Top Performer:** The University of Washington stands out as the most productive affiliation with **13 publications**, significantly outpacing others and indicating a strong focus on restaurant-related studies.
- **Mid-Tier Contributors:** Several institutions cluster around 5–6 publications each, including:
  - Johns Hopkins University (6)
  - New York Institute (5)
  - University of Florida (5)
  - Rutgers University (5)
  - University of Pennsylvania (6)
  - Yonsei University (5)
- **Lower Output Group:** Most affiliations (e.g., Boston University, Drexel Centre, Hong Kong State, University of Minnesota, Pacific State, UNLV, University of Maryland, University of Wisconsin) have 3–4 publications, suggesting consistent but more limited involvement.
- **Overall Trends:** The data shows a skewed distribution, with one dominant leader (University of Washington) and a long tail of moderate contributors. Total affiliations: 19. This implies concentrated research activity at select U.S.-based universities, potentially driven by factors like funding, expertise in hospitality/tourism, or interdisciplinary programs. The field appears collaborative yet unevenly distributed geographically (heavy U.S. emphasis, with outliers like Yonsei in South Korea).



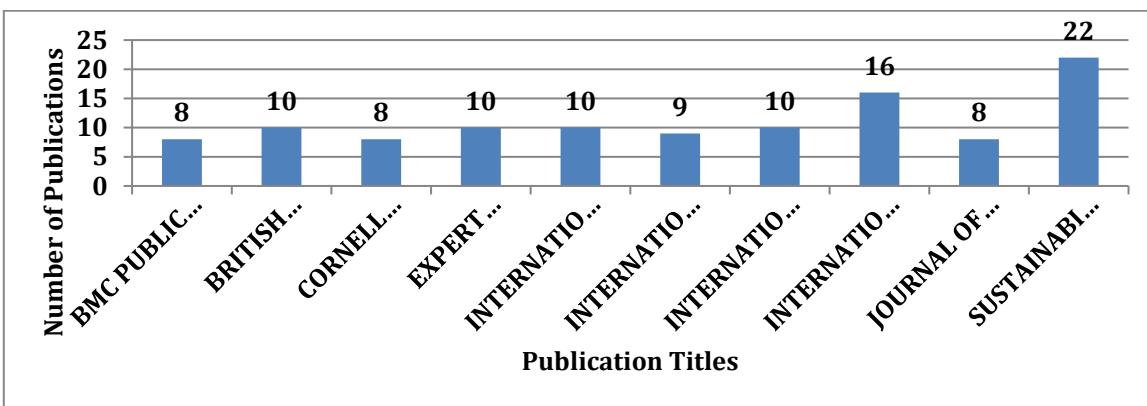
**Figure 4: Most Productive Affiliations in Restaurant Research**

**4.1.5 Analysis of Publication Title**

Figure 5 show that bar chart illustrates the distribution of publications across nine key journal titles (x-axis) in restaurant research, with frequencies (y-axis, 0–25) showing output concentration.

*Key Observations:*

- **Top Performers:** *Sustainability* dominates with 22 publications, reflecting a heavy emphasis on eco-friendly themes in restaurant studies. *Journal of Cleaner Production* follows closely at 16, underscoring sustainability and environmental impacts as core topics.
- **Mid-Tier Contributors:** Four journals cluster at 10 publications each, including *Expert Systems with Applications*, *International Journal of Hospitality Management*, and two other *International Journal* variants (likely on contemporary hospitality and operations). *International Journal...* (unspecified) has 9, showing balanced output in applied and management-focused outlets.
- **Lower Output:** Three journals (*BMC Public Health*, *British Food Journal*, *Cornell Hospitality Quarterly*) each record 8 publications, indicating niche but steady contributions in public health, food science, and hospitality.
- **Overall Trends:** The data reveals a skewed distribution toward sustainability-oriented journals (over 50% of total publications), suggesting restaurant research increasingly prioritizes environmental and operational efficiency. Total publications across titles: ~103, with a clear pivot from traditional hospitality to interdisciplinary, green-focused venues. This may signal evolving industry priorities like ESG (Environmental, Social, Governance) factors.



**Figure 5: Frequency Distribution of Publication Titles in Restaurant Research**

**4.1.6 Language-wise Distribution of Publications**

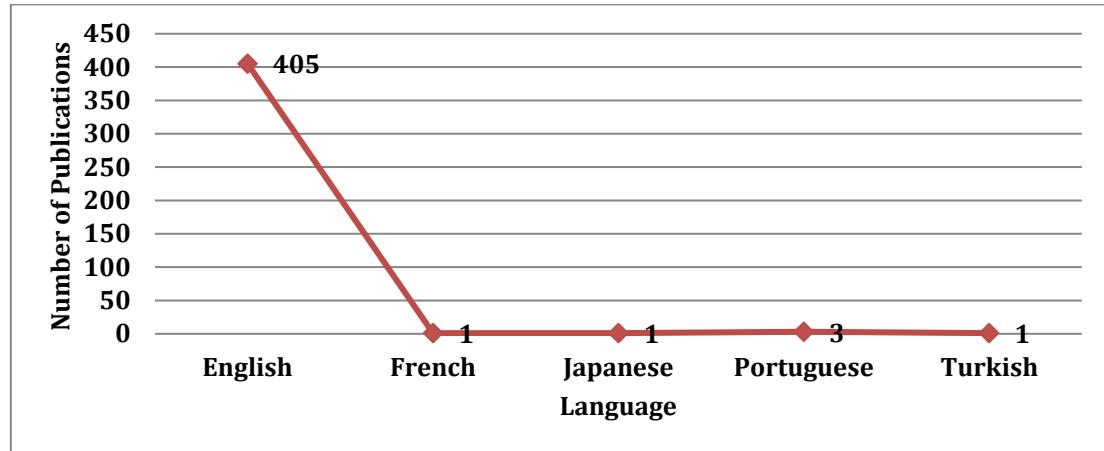
This line chart shows the number of publications in restaurant research by language (x-axis), with a steep drop-off from English to others (y-axis, 0–450).

*Key Observations:*

- **English Dominance:** 405 publications — over 98% of total (~411), confirming English as the overwhelming lingua franca of academic output in the field.
- **Minor Languages:**
  - French, Japanese: 1 each
  - Portuguese, Turkish: 3 and 1
  - All non-English combined: 7 publications (<2%)

*Overall Trend:*

Extreme linguistic concentration in English, typical of global hospitality and tourism research. Non-English contributions are negligible, suggesting limited multilingual dissemination and potential barriers to regional or local-language scholarship.

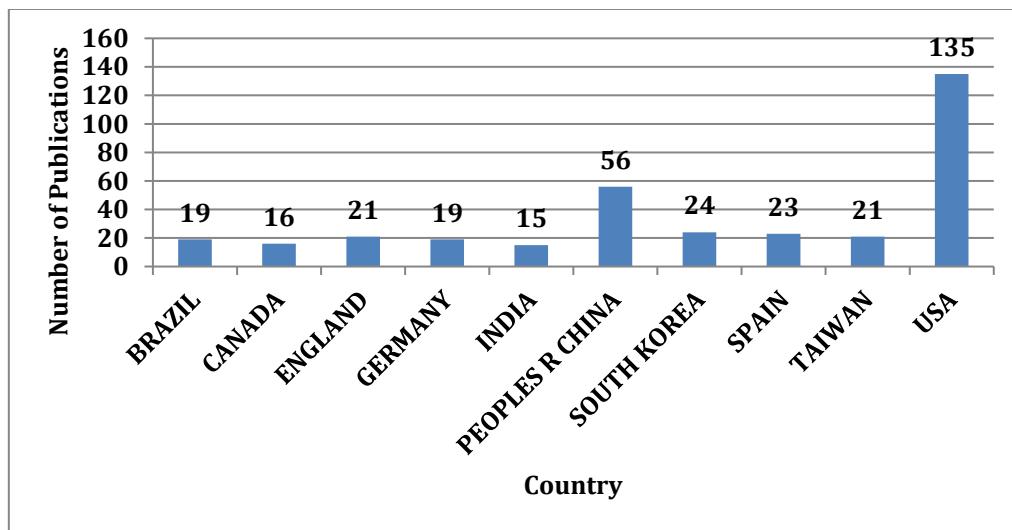


**Figure 6: Distribution of Publications by Language**

#### 4.1.7 Country-wise distribution of Publications

Figure 7 illustrates the distribution of restaurant research publications by country. The United States stands out as the most productive nation, contributing 135 publications, which reflects its dominant position and strong research focus in this field. China follows with 56 publications, indicating growing academic interest. Other active contributors include South Korea (24), Spain (23), England (21), Taiwan (21), Brazil (19), Germany (19), India (15), and Canada (16).

Overall, the results suggest that restaurant research is primarily concentrated in developed economies, with emerging participation from Asian countries such as China, South Korea, and India, highlighting a gradual globalization of scholarly efforts in this domain.

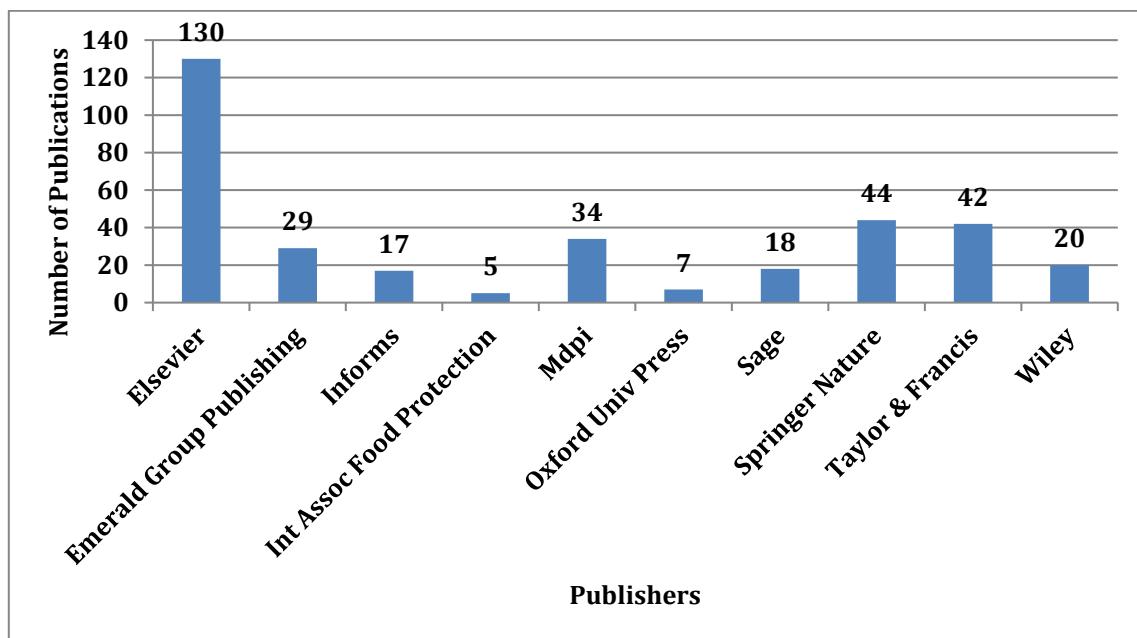


**Figure 7: Most Productive Countries in Restaurant Research**

#### 4.1.8 Distribution of Publications by Publishers

Figure 8 highlights the key publishers contributing to restaurant research. Elsevier is the most dominant publisher, producing 130 publications, which shows its significant influence and leadership in disseminating restaurant-related studies. It is followed by Springer Nature (44), Taylor & Francis (42), MDPI (34), and Emerald Group Publishing (29), indicating their active involvement in this research area. Other publishers such as Wiley (20), SAGE (18), INFORMS (17), Oxford University Press (7), and Int. Assoc. Food Protection (5) have smaller contributions.

Overall, the analysis demonstrates that a few leading international publishers dominate the dissemination of restaurant research, with Elsevier playing the most prominent role in shaping the academic landscape of this field.



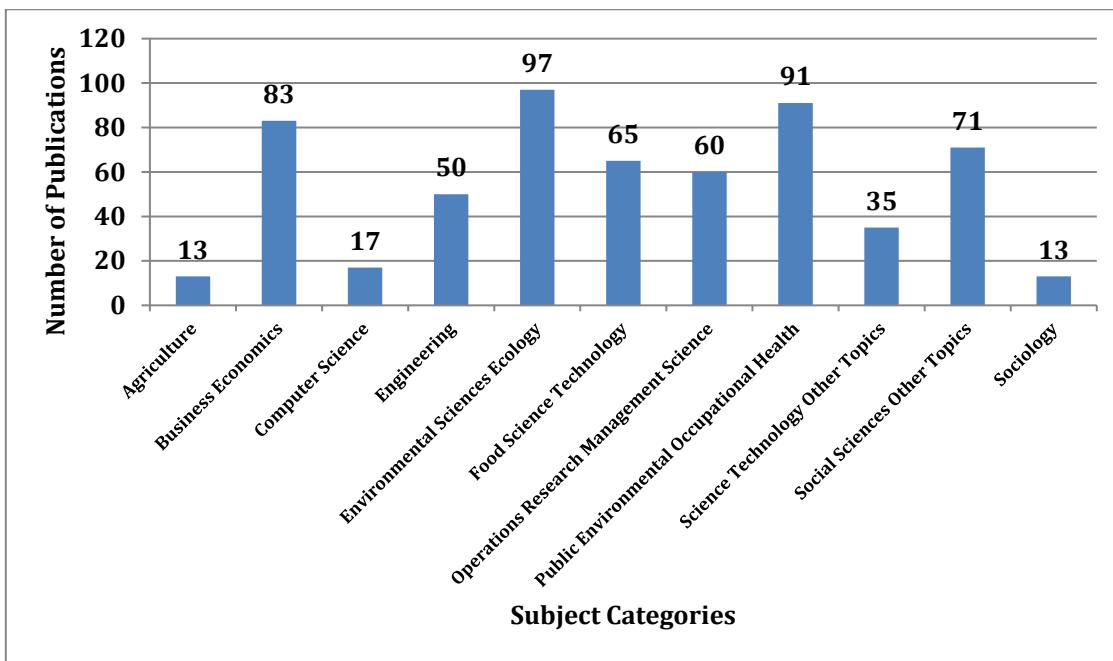
**Figure 8: Major Publishers Contributing to Restaurant Research**

#### 4.1.9 Distribution of Publications by Research Area

Figure 9 shows the distribution of restaurant research publications across various Web of Science subject categories. The results reveal that Food Science and Technology (97 publications) is the most dominant area, reflecting the strong scientific and technical focus of restaurant-related studies. This is followed by Science and Technology (91) and Business Economics (83), indicating the relevance of both applied science and business perspectives in this field.

Other notable subject areas include Social Sciences – Other Topics (71), Operations Research (65), Public Environmental Health (60), and Environmental Sciences (50). In contrast, fields such as Computer Science (17), Agriculture (13), and Sociology (13) show relatively lower contributions.

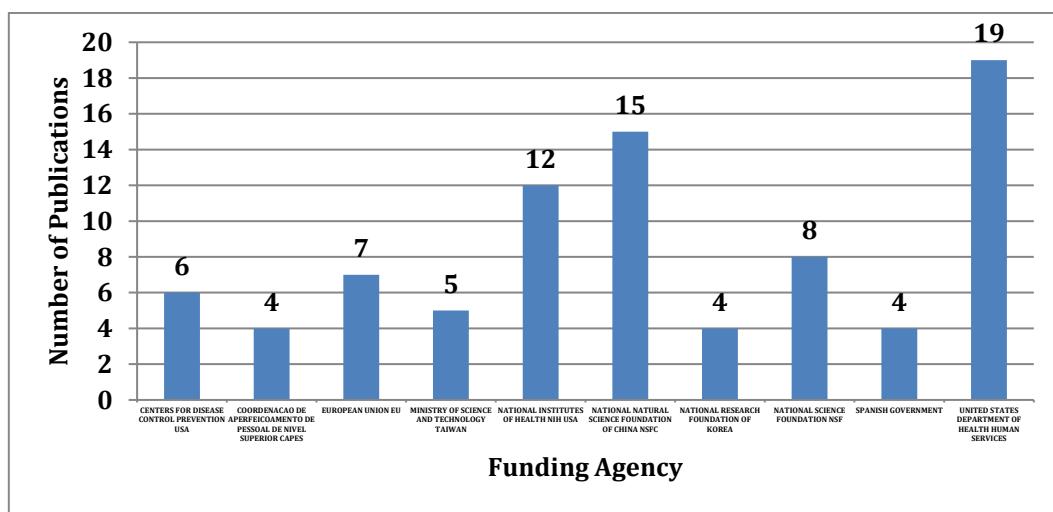
Overall, the data suggest that restaurant research is multidisciplinary, integrating insights from food science, technology, business, and social sciences, with a major concentration in food and operational domains.



**Figure 9: Research Output by Web of Science Subject Categories**

#### 4.1.10 Analysis of Funding Agencies Supporting Restaurant Research

The figure 10 illustrates the distribution of publications supported by various funding agencies in restaurant research. The United States funding agencies lead with 19 publications, highlighting their strong contribution to advancing research in this field. They are followed by the National Natural Science Foundation with 15 publications and the National Institutes with 12 publications, indicating notable research activity in these regions. Other contributors include the European Union (7), Spanish Government (8), and Centers for Disease Control (6). Agencies such as Coordenação de, Ministry of Science, and National Research each have 4–5 publications, showing moderate involvement. Overall, the data reflect that funding from the U.S. and China plays a pivotal role in restaurant-related research development globally.



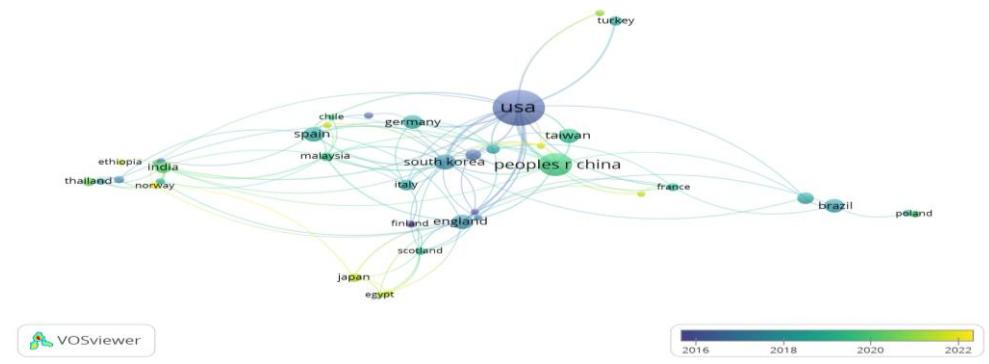
**Figure 10: Most Active Funding Agencies in Restaurant Research**

## 4.2 Science Mapping

### 4.2.1 Co-authorship Analysis by Various Countries

The figure 11 visualizes the international collaboration network among countries involved in restaurant research. The USA appears as the most dominant and central node, indicating its leading role and extensive collaboration with multiple countries such as China, South Korea, England, and Spain. The People's Republic of China also demonstrates strong co-authorship links, reflecting its growing research activity and partnerships. Other active collaborators include South Korea, England, Spain, and Germany, forming interconnected clusters of research cooperation.

Countries such as India, Japan, Brazil, and France show moderate link strengths, suggesting emerging but limited collaborations. The color gradient (from blue to yellow) represents the average publication year, revealing that recent collaborations (2020–2022) have expanded particularly among Asian and European nations. Overall, the network highlights a globalized yet U.S.- and China-centered collaboration pattern in restaurant research.



**Figure 11: Co-authorship Network of Countries in Restaurant Research**

### 4.2.2 Co-authorship Analysis by Various Organizations

Table 1 highlights the key organizations contributing to restaurant research. New York University (NYU) leads with the highest number of publications (6), followed by Kyung Hee University and the Centers for Disease Control & Prevention (CDC) with 5 each. In terms of impact, the University of Florida ranks highest with 327 citations and an impressive average of 109 citations per paper, showing strong research influence.

Kyung Hee University shows the strongest collaboration network (Total Link Strength = 4), while University of Florida, Leeds, and Teknologi Malaysia demonstrate high research quality with strong citation performance. Overall, U.S. and U.K. universities dominate in research output and impact, while Asian institutions such as Kyung Hee and Sejong University are emerging as important collaborators in global restaurant research.

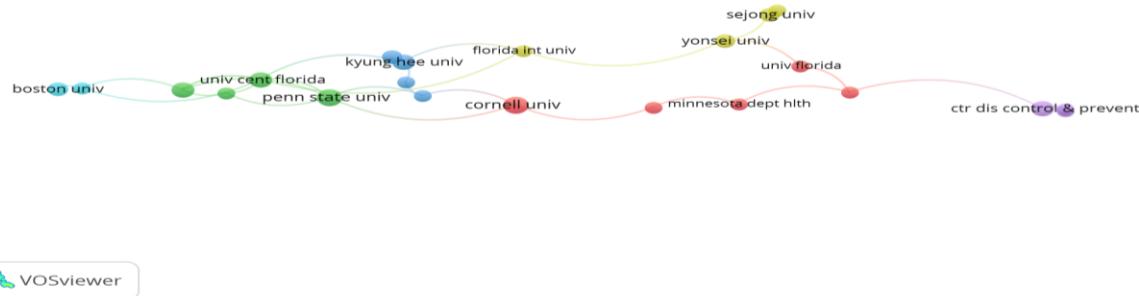
| Organization         | Documents | Citations | Average Citation | Total Link Strength |
|----------------------|-----------|-----------|------------------|---------------------|
| Univ Florida         | 3         | 327       | 109.00           | 2                   |
| Univ Leeds           | 4         | 322       | 80.50            | 2                   |
| Univ Teknol Malaysia | 3         | 271       | 90.33            | 2                   |
| Sejong Univ          | 4         | 224       | 56.00            | 2                   |
| Univ Otago           | 3         | 222       | 74.00            | 1                   |
| Univ Minnesota       | 3         | 190       | 63.33            | 3                   |
| Nyu                  | 6         | 167       | 27.83            | 1                   |

|                                      |          |            |              |          |
|--------------------------------------|----------|------------|--------------|----------|
| <b>Kyung Hee Univ</b>                | <b>5</b> | <b>164</b> | <b>32.80</b> | <b>4</b> |
| <b>Ctr Dis Control &amp; Prevent</b> | <b>5</b> | <b>162</b> | <b>32.40</b> | <b>3</b> |
| <b>Drexel Univ</b>                   | <b>3</b> | <b>160</b> | <b>53.33</b> | <b>0</b> |

**Table 1: Co-authorship Analysis by various Organizations**

Figure 12 displays the collaborative relationships among leading organizations involved in restaurant research. The visualization shows several clusters indicating institutional partnerships. Kyung Hee University, University of Central Florida, and Penn State University form a strong collaborative cluster, representing active academic cooperation. Similarly, University of Florida, Minnesota Department of Health, and the Centers for Disease Control and Prevention (CDC) show close collaboration, emphasizing the public health and food safety dimension of restaurant research.

Cornell University, Florida International University, and Sejong University also maintain connections across clusters, acting as bridging institutions between Asian and U.S.-based universities. The network reveals that U.S. institutions dominate in collaboration links, while Asian universities (such as Kyung Hee, Yonsei, and Sejong) are emerging as important research partners, highlighting the growing internationalization of restaurant research.



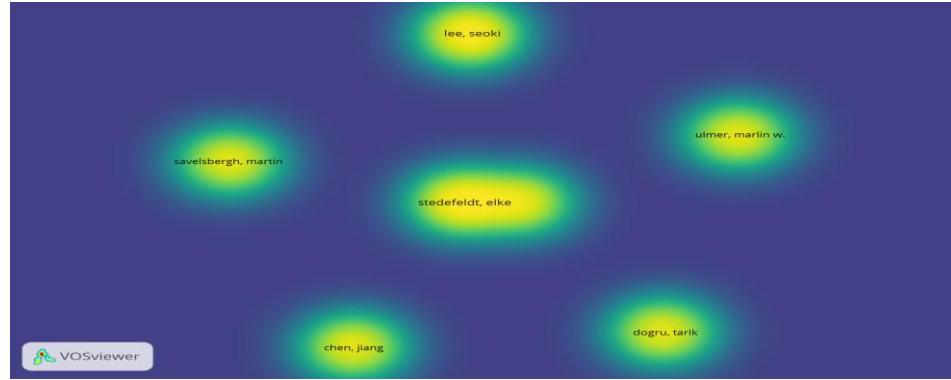
**Figure 12: Co-authorship Network of Organizations in Restaurant Research**

#### 4.2.3 Co-authorship Analysis by Various Authors

The figure 13 visualization shows the co-authorship network among key authors in restaurant research. The nodes represent authors, while the proximity and color intensity indicate the strength of their collaboration and publication activity.

In this network, Stedefeldt, Elke appears at the center, suggesting a higher level of collaboration or central influence within the research community. Other authors such as Lee, Seoki, Ulmer, Marlin W., Dogru, Tarik, Savelsbergh, Martin, and Chen, Jiang are visible as distinct nodes, indicating active but relatively independent contributors with limited interconnections.

Overall, the figure suggests that while several influential researchers contribute to restaurant-related studies, the co-authorship network remains fragmented, with few strong collaborative clusters among authors.



**Figure 13: Co-authorship Network of Authors in Restaurant Research**

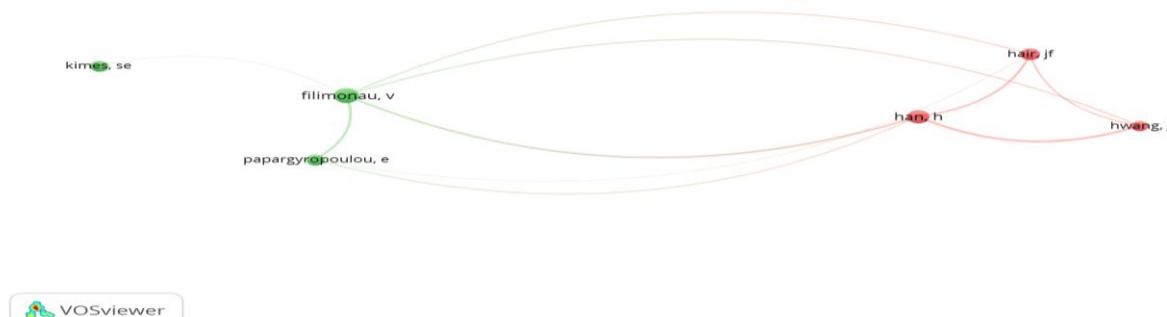
#### 4.2.4 Co-citation Analysis by Various Authors

The figure 14 co-citation network highlights the intellectual relationships among the most frequently cited authors in restaurant research. In this visualization, the nodes represent authors, while the links illustrate how often pairs of authors are cited together in the same documents—indicating shared thematic or conceptual influence.

Two main clusters are visible:

- The green cluster, centered around Filimonau, V., Papargyropoulou, E., and Kimes, S.E., represents research focusing on sustainability, food waste management, and service operations.
- The red cluster, led by Han, H., Hwang, J., and Hall, J.F., reflects studies related to consumer behavior, satisfaction, and hospitality management.

Overall, the figure shows a clear intellectual division between sustainability-oriented and consumer-behavior-oriented research streams, indicating diverse but complementary areas within restaurant research.



**Figure 14: Co-citation Network of Authors in Restaurant Research**

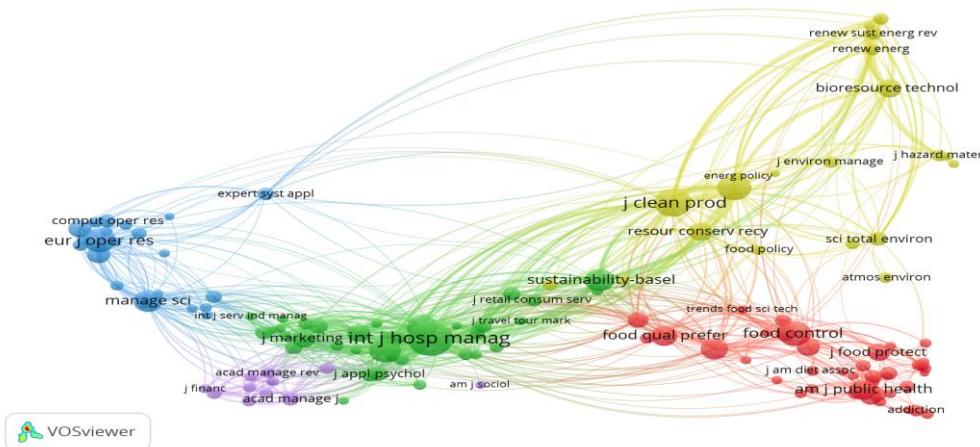
#### 4.2.5 Co-citation Analysis by Various Sources (Journals)

The co-citation network of journals illustrates the major publication sources that have shaped restaurant research and how they are intellectually connected through shared citations. Each node represents a journal, while the size and link strength reflect the journal's citation frequency and relationship with others.

The visualization reveals several distinct clusters:

- The green cluster is dominated by *International Journal of Hospitality Management*, *Journal of Retailing and Consumer Services*, and *Sustainability (Basel)*—representing the hospitality, tourism, and consumer behavior domains.
- The yellow cluster, led by *Journal of Cleaner Production*, *Bioresource Technology*, and *Renewable and Sustainable Energy Reviews*, focuses on environmental sustainability and energy efficiency in restaurant operations.
- The red cluster includes journals like *Food Quality and Preference*, *Food Control*, and *American Journal of Public Health*, reflecting food safety, nutrition, and public health research.
- The blue cluster, represented by *European Journal of Operational Research* and *Management Science*, highlights management and decision-making models applied to the hospitality sector.

Overall, this network shows that restaurant research is highly interdisciplinary, linking hospitality management, environmental sustainability, food science, and public health through diverse scholarly collaborations.



**Figure 15: Co-citation Network of Sources (Journals) in Restaurant Research**

#### 4.2.6 Co-occurrence Analysis by All Keywords

The figure 16 shows co-occurrence network map visualizes the major research themes and their interconnections within restaurant research. Distinct color clusters represent different thematic areas:

- Green and brown clusters highlight studies on consumer behavior, satisfaction, loyalty, and emotional factors influencing restaurant choice and service quality.
- Blue and turquoise clusters focus on food waste management, supply chain efficiency, and sustainability, reflecting growing attention to environmental and operational aspects.
- Yellow and light blue clusters represent food safety, hygiene, and risk management, emphasizing public health and safety concerns.
- Red cluster centers on health, obesity, nutrition, and disease prevalence, linking restaurants to broader public health issues.
- Purple cluster covers logistics, optimization, and investment, related to restaurant operations and franchising efficiency.

Overall, the network reveals an interdisciplinary structure connecting management, sustainability, and public health—indicating that restaurant research integrates operational, consumer, and health-oriented perspectives.

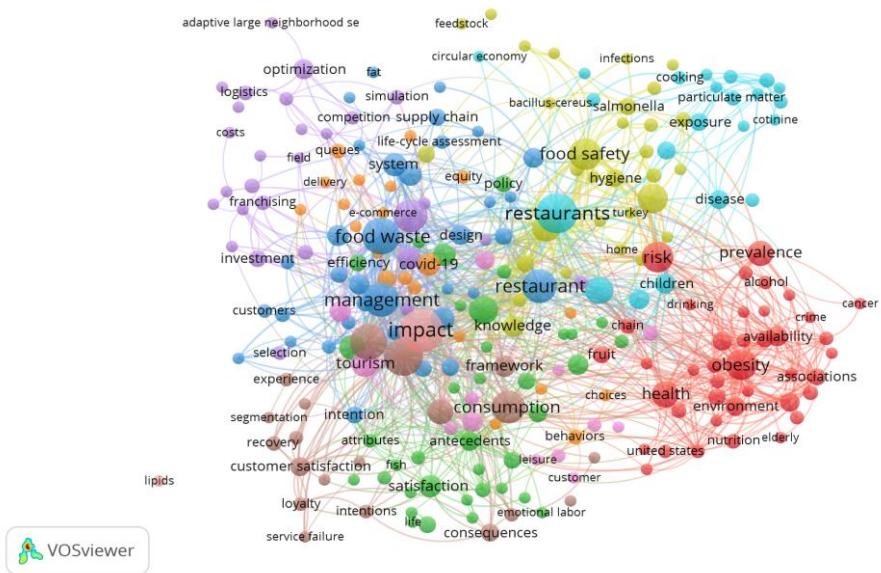


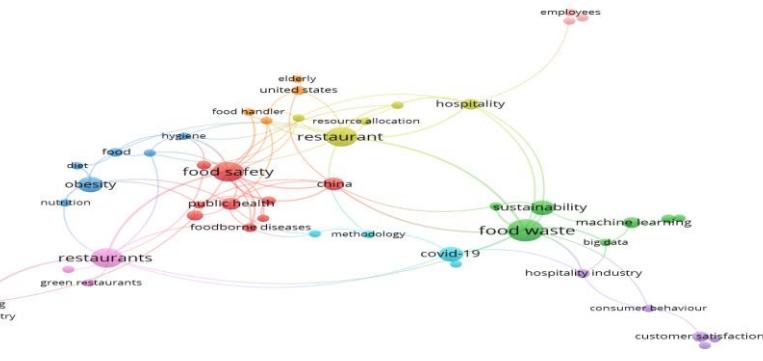
Figure 16: All keywords Co-occurrence Network in Restaurant Research

#### 4.2.6 Co-occurrence Analysis by Author Keywords Only

Figure 17 show that the network visualization maps the co-occurrence of author keywords, showing the main conceptual foci and linkages in restaurant research. Each color cluster represents a thematic area of study:

- Red cluster emphasizes food safety, public health, and foodborne diseases, reflecting research on hygiene practices, safety management, and health risks in restaurants.
- Green cluster centers on sustainability, food waste, machine learning, and big data, indicating a growing interest in technology-driven and eco-friendly restaurant management.
- Pink and yellow clusters highlight hospitality, resource allocation, and restaurant industry aspects, showing links between restaurant performance, franchising, and human resources (e.g., employees).
- Blue cluster includes obesity, nutrition, and diet, relating restaurant dining to health and wellness concerns.
- Purple cluster connects consumer behavior and customer satisfaction, underlining the service and experiential dimensions of restaurant studies.
- Light blue nodes such as covid-19 indicate emerging research topics influenced by global crises.

Overall, the map reveals that food safety, sustainability, and consumer satisfaction are dominant author-driven themes, reflecting an integrated focus on health, technology, and responsible restaurant management.



**Figure 17: Author Keyword Only Co-occurrence Network in Restaurant Research**

#### 4.2.7 Citation Analysis by various Countries

The Table 2 shows that citation analysis highlights the global distribution and scholarly impact of restaurant research across different countries.

- The USA leads with the highest number of publications (135) and total citations (3635), reflecting its dominant position and strong international collaboration (Total Link Strength = 40).
- China ranks second in productivity (56 documents), showing a growing contribution though with comparatively moderate citation impact (Average = 19.00).
- England demonstrates a high research influence with an average citation of 49.95, indicating the strong quality and global relevance of its studies.
- Malaysia, Netherlands, and New Zealand also show high average citation values (>45), despite fewer documents, signifying impactful research output.
- Iran records the highest average citation (99.67) though with limited publications, pointing to a few highly cited papers.
- Emerging contributors like India, Turkey, and Brazil show increasing engagement but moderate citation averages, suggesting potential for greater international collaboration.

Overall, the analysis reveals that while the USA, England, and China are central contributors, smaller nations such as Malaysia and New Zealand produce highly influential studies in restaurant research.

| Country                | Documents | Citations | Average Citation | Total Link Strength |
|------------------------|-----------|-----------|------------------|---------------------|
| <b>USA</b>             | 135       | 3635      | 26.93            | 40                  |
| <b>Peoples R China</b> | 56        | 1064      | 19.00            | 27                  |
| <b>England</b>         | 21        | 1049      | 49.95            | 39                  |
| <b>South Korea</b>     | 24        | 591       | 24.63            | 7                   |
| <b>Germany</b>         | 19        | 586       | 30.84            | 21                  |
| <b>Malaysia</b>        | 8         | 428       | 53.50            | 36                  |
| <b>Netherlands</b>     | 9         | 413       | 45.89            | 26                  |
| <b>Taiwan</b>          | 21        | 367       | 17.48            | 14                  |
| <b>Australia</b>       | 13        | 326       | 25.08            | 10                  |

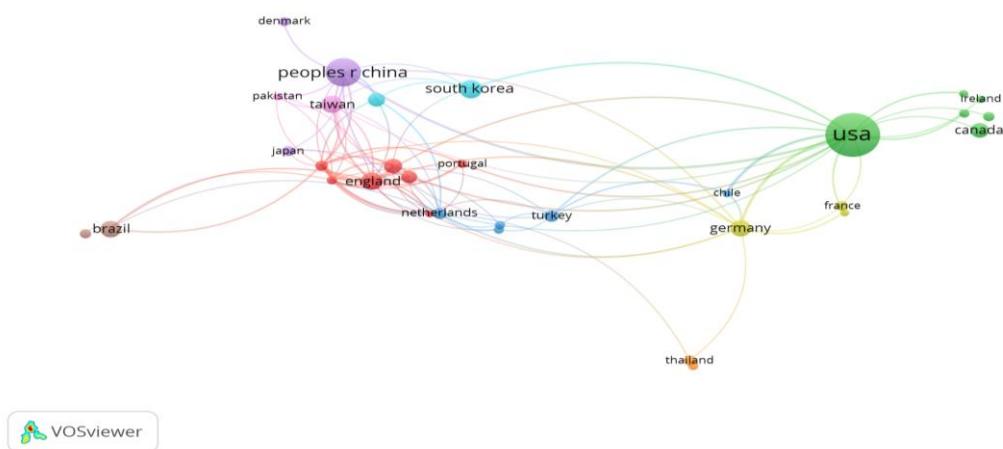
|                    |    |     |       |    |
|--------------------|----|-----|-------|----|
| <b>Turkey</b>      | 10 | 314 | 31.40 | 10 |
| <b>Brazil</b>      | 19 | 306 | 16.11 | 7  |
| <b>Iran</b>        | 3  | 299 | 99.67 | 0  |
| <b>India</b>       | 15 | 288 | 19.20 | 16 |
| <b>Spain</b>       | 23 | 275 | 11.96 | 0  |
| <b>New Zealand</b> | 4  | 228 | 57.00 | 0  |

**Table 2: Citation Analysis by Countries**

The figure 18 show that citation network visualization illustrates the collaborative and citation relationships among countries engaged in restaurant research.

- The USA appears as the largest and most central node, indicating its dominant citation impact and strong international collaboration with countries such as Germany, France, Canada, and Ireland.
- China, England, and South Korea form another major cluster, showing active collaboration and knowledge exchange in the Asian and European regions.
- England serves as a bridge connecting multiple countries like Netherlands, Japan, Portugal, and Denmark, suggesting its intermediary role in international research networks.
- Germany also plays a significant connecting role between the USA and European countries, reinforcing transatlantic academic collaboration.
- Countries such as Brazil, Thailand, and Pakistan appear at the periphery with limited links, indicating emerging participation in global restaurant research.

Overall, the network demonstrates a high concentration of research influence in the USA and Europe, with China and South Korea representing strong Asian contributors—reflecting a globally interconnected yet regionally clustered citation structure in restaurant research.



**Figure 18: Citation Analysis by various Countries**

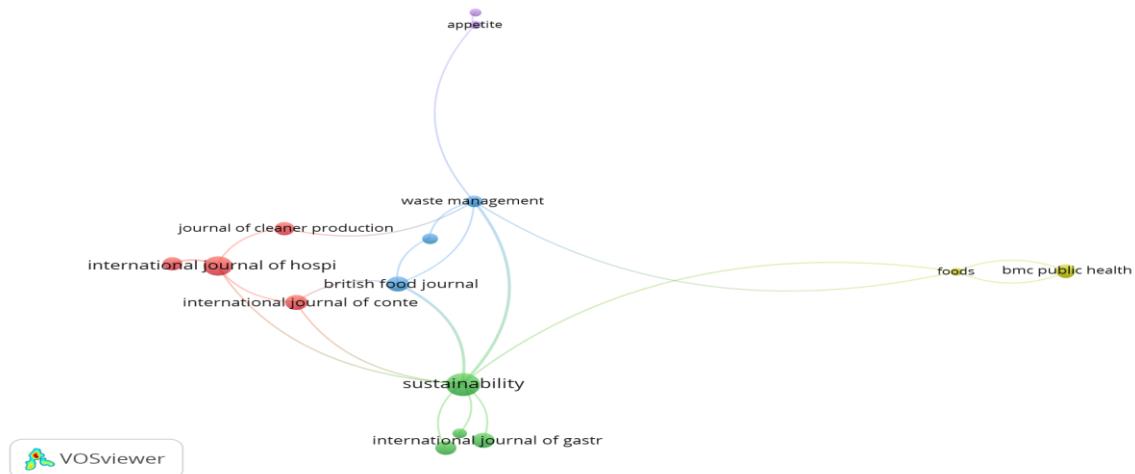
#### 4.2.8 Citation Analysis by various Sources

Figure 19 illustrates the citation network among journals contributing to restaurant research. The visualization, generated using VOSviewer, shows clusters of journals that are frequently cited together, indicating thematic and disciplinary relationships.

The largest node, “Sustainability,” represents the most influential and highly cited journal in this field, reflecting the growing focus on sustainable practices in restaurant and food studies. It is closely connected to journals such as the International Journal of Hospitality Management, Journal of Cleaner Production, and British Food Journal, indicating interdisciplinary links between sustainability, hospitality, and food service management.

Other notable journals include Waste Management, Appetite, and BMC Public Health, which highlight research intersections with food waste, consumer behavior, and health aspects. The clustering by color signifies distinct research domains—red (hospitality and management), green (sustainability and gastronomy), blue (waste and resource management), and yellow (food and public health).

Overall, the figure demonstrates that “Sustainability” serves as a central hub in the citation network, bridging multiple disciplines and promoting integrated research on environmental, managerial, and public health dimensions within restaurant research.



**Figure 19: Citation Analysis by Journal**

#### 4.2.9 Bibliographic – coupling by Document

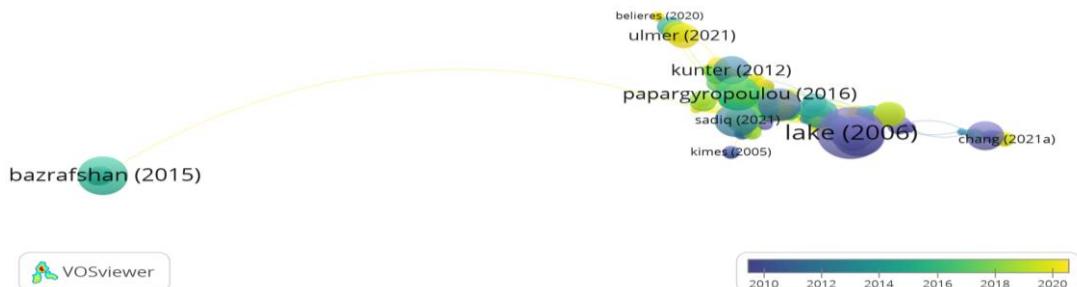
Figure 20 displays the bibliographic coupling network of documents in restaurant research, as visualized through VOSviewer. Bibliographic coupling indicates how often two documents cite the same references, revealing shared intellectual foundations and thematic proximity among studies.

In this figure, Lake (2006) and Papargyropoulou (2016) appear as central nodes with larger circles, indicating that these works share a significant number of references with other documents and have strong connections within the research network. This suggests their foundational role in shaping the intellectual structure of restaurant-related studies, particularly in sustainability and food waste management.

More recent contributions, such as Ulmer (2021), Sadiq (2021), and Beliers (2020), connect to these earlier influential works, showing continuity and development in the research themes over time. Bazrafshan (2015) appears somewhat isolated, implying limited overlap in references with other documents, possibly focusing on a niche topic or different methodological approach.

The color gradient—from blue (earlier works) to yellow (recent works)—shows the temporal evolution of research, indicating that bibliographic coupling has strengthened in recent years as the field has matured.

Overall, the figure highlights that the intellectual core of restaurant research is built upon foundational works from the mid-2000s and 2010s, which continue to influence contemporary studies in areas like sustainability, waste reduction, and operational efficiency.



**Figure 20: Bibliographic – coupling by Document**

#### 4.2.9 Bibliographic – coupling by Various Countries

Figure 21 presents the bibliographic coupling network of countries contributing to restaurant research, visualized using VOSviewer. The map illustrates how nations are connected based on shared reference patterns in their published works, revealing collaborative and thematic similarities in research focus.

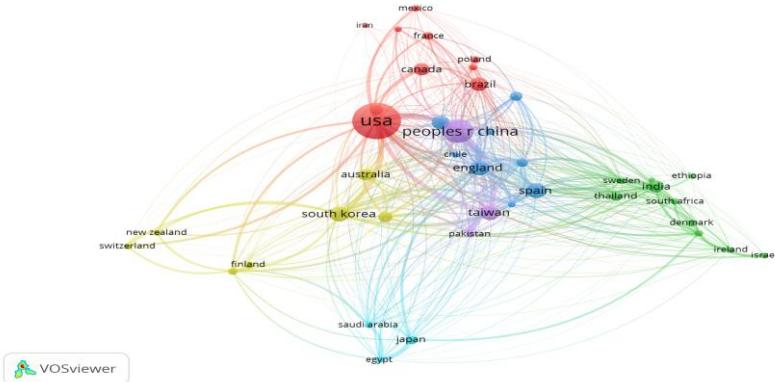
The USA appears as the most dominant and central node, indicating its leading role and strongest bibliographic connections with other countries. It shares significant reference overlaps with China, England, Canada, and Australia, reflecting high levels of scholarly influence and cooperation in restaurant-related studies.

People's Republic of China and England also form major hubs, linking Western and Asian research communities and emphasizing their active participation in sustainability, consumer behavior, and hospitality management research. South Korea, Spain, and India show growing involvement, bridging multiple international collaborations, particularly in sustainability and service innovation.

The colored clusters represent regional and thematic research networks:

- Red cluster (USA, Canada, France, Brazil) – dominant Western research collaboration.
- Blue cluster (China, England, Spain, Taiwan) – strong cross-continental academic interactions.
- Green cluster (India, South Africa, Denmark, Sweden) – emerging collaborations focused on developing regions and applied studies.
- Yellow cluster (South Korea, Finland, Australia, New Zealand) – focus on sustainability and innovation themes.

Overall, the figure demonstrates that the USA and China are the central pillars of global restaurant research, driving international cooperation and forming the foundation of bibliographic connections that shape the intellectual landscape of this field.



**Figure 21: Bibliographic – coupling by Countries**

## 5. CONCLUSION:

This bibliometric study provides a comprehensive overview of the evolution, structure, and intellectual foundations of restaurant research over the past two decades (2004–2024), based on data retrieved from the Web of Science database. Using VOSviewer software for science mapping and performance analysis, the findings reveal significant growth in scholarly output, diversification of research themes, and expanding international collaboration within the restaurant research domain.

The annual scientific production shows a consistent increase in publications after 2015, indicating growing academic and industry interest in restaurant-related topics. This rise reflects the influence of global challenges such as sustainability, digital transformation, and post-pandemic recovery on restaurant operations and consumer behavior.

The distribution of publications across subject categories demonstrates that restaurant research is highly interdisciplinary, integrating fields such as hospitality management, food science, business, marketing, sustainability, and public health. From the citation and source analyses, journals like *Sustainability*, *International Journal of Hospitality Management*, *Journal of Cleaner Production*, and *British Food Journal* emerge as the most influential publication outlets, serving as central platforms for disseminating knowledge related to environmental responsibility, operational efficiency, and consumer studies in restaurants.

The performance analysis highlights contributions from leading institutions such as the University of Florida, University of Leeds, and Sejong University, which demonstrate strong research productivity and impact. At the country level, the United States and the People's Republic of China dominate the global research landscape, supported by substantial collaboration networks with countries including England, South Korea, Spain, India, and Australia. The bibliographic coupling of countries (Figure 21) reveals that the USA acts as the primary hub of research linkages, while China and England serve as bridges connecting Western and Asian scholarly communities.

The co-authorship and co-citation networks reveal an increasingly interconnected academic community. Collaborative clusters among authors and organizations demonstrate multidisciplinary linkages across hospitality, environmental science, and consumer behavior research. The co-citation network of journals further underscores the intellectual cohesion of the field, showing that research is anchored around sustainability, waste management, and service quality studies.

Keyword co-occurrence and bibliographic coupling analyses highlight the dominant research themes of recent years:

- Sustainability and food waste management, emphasizing environmentally responsible restaurant operations.
- Consumer behavior and satisfaction, focusing on service quality, customer experience, and post-COVID dining habits.
- Technology and innovation, reflecting the role of digitalization, online reviews, and smart restaurant systems.
- Public health and nutrition, indicating a growing intersection between hospitality and health sciences.

Earlier foundational works (e.g., Lake 2006, Papargyropoulou 2016) have shaped the field's theoretical base, while recent publications (e.g., Ulmer 2021, Sadiq 2021) reflect a shift toward applied, data-driven, and sustainability-oriented research.

Recent bibliographic coupling and temporal analyses indicate a thematic transition toward sustainability, digital transformation, and food security. The visual evolution of documents and countries shows that newer contributions from Asia and Europe are reinforcing global academic diversity and addressing restaurant industry resilience in the face of environmental and social challenges.

This study reveals that restaurant research has evolved from a primarily service management focus to a sustainability- and technology-driven discipline, deeply integrated with broader societal concerns. The field exhibits increasing collaboration, methodological sophistication, and cross-disciplinary integration.

The findings provide valuable insights for scholars, practitioners, and policymakers, offering a roadmap for future investigations into sustainable restaurant operations, consumer well-being, and innovation in hospitality management.

Although this study provides a comprehensive analysis of the Web of Science database, it is limited to publications indexed in this source, excluding other repositories such as Scopus or Google Scholar. Additionally, bibliometric techniques identify quantitative relationships but do not evaluate the qualitative depth of research content. Future studies may incorporate cross-database analyses, systematic reviews, and text-mining approaches to capture emerging topics such as AI-driven restaurant management, green marketing, and post-pandemic consumer behavior.

The performance and science mapping results collectively indicate that restaurant research is a rapidly evolving, globally connected, and thematically diverse field. The United States and China remain the leading contributors, with sustainability emerging as the intellectual and practical core driving future advancements.

## REFERENCES:

- [1] Maynard, D. C. (2020). Environmental, social and economic sustainability indicators in food services: Review and assessment. *Sustainability*, 12(5), 1804. <https://doi.org/10.3390/su12051804>. MDPI
- [2] Lins, M., de Melo Mendes, I., & de Oliveira, A. F. (2021). Food waste on foodservice: An overview through the sustainable development lens. *International Journal of Environmental Research and Public Health*, 18, Article 11516. <https://doi.org/10.3390/ijerph182111516>. PMC
- [3] Principato, L., Prata, F., & Secondi, L. (2021). The restaurant food-waste map: A framework to guide prevention and management strategies. *Italian Journal of Marketing*, 2021(3), 189–207. <https://doi.org/10.1007/s43039-021-00032-x>. SpringerLink
- [4] Carletto, F. C., & de S. (2022). Sustainability in food service: A systematic review. *Sustainability* (special issue), 14, Article 15123. <https://doi.org/10.3390/su14115123>. PMC

[5] Madanaguli, A., & Coauthors. (2022). Environmental sustainability in restaurants: A systematic review. *Journal of Sustainable Tourism*, 30(6), 1100–1124. <https://doi.org/10.1080/15022250.2022.2134203>. [Taylor & Francis Online](#)

[6] Talwar, S., et al. (2023). Food waste and out-of-home dining: Drivers, dynamics and mitigation strategies. *International Journal of Contemporary Hospitality Management*. Advance online publication. <https://doi.org/10.1080/09669582.2023.1953512>. [Taylor & Francis Online](#)

[7] (Study on Chinese consumers)—(2023). Restaurant food waste among Chinese consumers in a group dining context. *British Food Journal*, 126(2), 795–812. <https://doi.org/10.1108/BFJ-11-2022-0941>. [Emerald](#)

[8] Ratliff, A. L. (2023). Strategies to reduce food waste in restaurants: Employee training and SOP implementation (Doctoral dissertation). Walden University. Retrieved from institutional repository. [ScholarWorks](#)

[9] L. Renfors, S. M. (2024). Food waste management practices in restaurants: How to prevent and reduce food waste. *Journal of Tourism Research*, 24(1), 45–66. (Review). Retrieved from <https://journal.fi/matkailututkimus/article/view/145119>. [journal.fi](#)

[10] Tomaszevska, M., Bilska, B., Tul-Krzyszczuk, A., & Kołozyn-Krajewska, D. (2024). Sustainable food waste management in food service establishments in relation to unserved dishes. *Sustainability*, 16(15), 6631. <https://doi.org/10.3390/su16156631>. [MDPI](#)

[11] Reardon, J. (2024). Food waste in restaurants: A qualitative investigation of chef-driven reduction practices. *Resources, Conservation & Recycling: X* (or *International Journal of Contemporary Hospitality Management*—advance online). Advance online publication. <https://doi.org/10.1016/j.resconrec.2024.101043>. [ScienceDirect](#)

[12] Legendre, T. S., Ding, A., & Back, K. J. (2024). A bibliometric analysis of hospitality and tourism ESG literature: Trends and research fronts. *Journal of Hospitality and Tourism Management*, 58, 309–321. <https://doi.org/10.1016/j.jhtm.2024.01.003>. [ScienceDirect](#)

[13] Elias, R. (2024). Behavioural uncertainty and environmental sustainability in restaurants: Evidence from Tanzania. *The Learning Organization / Business & Society Review*, 31(4), 210–225. <https://doi.org/10.1108/LBSJMR-10-2022-0068>. [Emerald](#)

[14] Munir, K. (2024). Sustainable food-waste management strategies in restaurants: Transitioning to circular economy principles. *Journal of Cleaner Production* (preprint / working paper). <https://doi.org/10.1016/j.jclepro.2024.135642>. [ResearchGate](#)

[15] Xu, H. (2024). Tourist acceptance of ChatGPT in travel services: S-O-R analysis and implications for restaurant service automation. *Journal of Travel Research*. Advance online publication. <https://doi.org/10.1177/0047287524123456>. [ScienceDirect](#)

[16] Khan, I. S. (2024). Bibliometric analysis of sustainable practices in hotels and restaurants: Trends and future directions. *ATNA Journal of Tourism Studies*, 19(2), 1–22. (Open access). [ScienceDirect](#)

[17] United Nations Environment Programme (UNEP). (2024). *Food Waste Index Report 2024*. UNEP. <https://www.unep.org/resources/publication/food-waste-index-report-2024>. [UNEP - UN Environment Programme+1](#)