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JOB SATISFACTION IN THE AUTOMOTIVE SECTOR UNDER TECHNOLOGICAL AND SUSTAINABLE TRANSITIONS: A GLOBAL BIBLIOMETRIC REVIEW

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Abstract

This paper presents a bibliometric review of scholarly work on job satisfaction in the automotive sector, framed by technological change and sustainability transitions. An initial Scopus search covering 2011–2025 returned 238 records; following systematic screening to remove duplicates, non-relevant items, and incomplete entries, the dataset was refined to 122 publications for analysis. Through the use of VOSviewer software for bibliometric mapping and network studies, the intellectual structure of the area was examined through thematic progression, co-authorship networks, and keyword co-occurrence. The findings reveal emerging clusters that reflect current concerns: reskilling and upskilling for automation, psychosocial risks associated with digitalization, green jobs and sustainable mobility, and the role of digital HRM practices. They also highlight the key authors, journals, and nations influencing research on workplace well-being in automotive contexts. The analysis also highlights temporal shifts in focus, showing increasing attention to AI, Industry 4.0 technologies, and environmental sustainability in recent years. By synthesizing these patterns, the review identifies key knowledge gaps and proposes directions for future research and policy that bridge technological, environmental, and socio-economic perspectives. The findings aim to support academics, industry practitioners, and policymakers in designing evidence-based strategies to manage workforce transitions while maintaining and enhancing employee satisfaction in a rapidly transforming automotive landscape.

Keywords: Job satisfaction, Automotive industry, Eco-friendly manufacturing, Green jobs, and Industry 4.0

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INTRODUCTION

Advances in technology and a global push for sustainability are driving a tremendous revolution in the car sector. Throughout the automotive value chain, work dynamics and organizational structures have changed as a result of the integration of Industry 4.0 technologies, such as artificial intelligence (AI), automation, robotics, and digital manufacturing, as well as the pressing need for environmental sustainability (Jabbour et al., 2018; Krishnan et al., 2020). These rapid changes have improved productivity and efficiency, but they have also had a big impact on work roles, employee experiences, and satisfaction levels (Böhm et al., 2021). As the sector transitions to electrification, eco-friendly manufacturing, and circular economy models, comprehending the factors influencing job satisfaction amid technological and sustainable shifts has become essential for both academic research and practical application (Elkington, 2013; Kassem et al., 2022).

Job satisfaction, a crucial factor influencing both organizational success and employee well-being, has been thoroughly examined in traditional industrial settings (Locke, 1976; Spector, 1997). In the automotive industry, however, it is now being transformed by elements such as job redesign driven by automation, the obsolescence of skills, the need for digital proficiency, and restructuring motivated by sustainability (Pfeiffer, 2017; Totterdill, 2020). While adopting green technologies and adhering to environmental standards creates "green jobs," they also create new challenges, such as job security uncertainty, digital tool adaptation, and the psychological effects of ongoing innovation. As a result, employee satisfaction now depends not only on traditional factors like salary, working conditions, and management but also on how organizations handle technological changes, provide learning opportunities, and uphold ecological values (Yousef, 2017; Haddoud et al., 2023).

Researchers are increasingly studying digital transformation and human factors in the automotive industry. Studies indicate that automation and digitalization can either boost satisfaction by eliminating repetitive tasks and enhancing safety or reduce it by limiting autonomy and increasing surveillance (Frey & Osborne, 2017; Müller et al., 2019). Likewise, the shift towards sustainability presents a dual challenge: achieving a balance between ecological performance and social welfare (Choudhury & Srai, 2020). As companies transition to electric mobility and eco-friendly manufacturing, they must align environmental goals with human resource strategies that promote engagement and satisfaction (Lee et al., 2021). Despite these advancements, research on job satisfaction in the automotive industry remains scattered, with studies spread across fields like management, industrial psychology, human resource development, and environmental engineering (Kraus et al., 2021). There is a lack of consolidated knowledge on how technological and sustainability changes together affect workforce satisfaction. Additionally, few studies systematically explore the intellectual framework and thematic progression of this area, limiting scholars' ability to pinpoint gaps, emerging trends, and opportunities for collaboration (Donthu et al., 2021). The current study employs bibliometrics to investigate global automotive job satisfaction research from 2011 to 2025 to close this gap. This research uses Scopus and VOSviewer to show publishing trends, co-authorship patterns, and keyword networks to reveal

field-influencing theme clusters. The study integrates technological, environmental, and human factors to synthesize knowledge and identify sustainable industrial transformation research topics.

This bibliometric review enhances both academic research and industry practices by elucidating the impact of digitalization, automation, and sustainability transitions on job satisfaction and organizational resilience. It lays the groundwork for policymakers and business leaders to develop evidence-based strategies that facilitate workforce adaptation, improve job quality, and promote sustainable growth in the rapidly changing automotive sector.

This research utilizes a bibliometric and network analysis method to systematically explore global studies on job satisfaction in the automotive industry, specifically in the context of technological and sustainable changes. The methodology combines quantitative bibliometric techniques with visualization tools to reveal publication trends, intellectual frameworks, and thematic progressions over time. This objective and reproducible method reveals research themes, authorship patterns, and collaborations in the scientific environment. Technological advances and a global sustainability movement are transforming the car business. Industry 4.0 technologies like AI, automation, robotics, and digital manufacturing, along with environmental sustainability, have changed automotive value chain work processes, organizational structures, and employee roles. These rapid changes have improved operational efficiency and productivity but also affected employee experiences, job roles, and happiness (Böhm et al., 2021; Frey & Osborne, 2017). As the industry transitions to electrification, green manufacturing, and circular economy models, understanding the dynamics of job satisfaction amid technological and sustainable changes has become both an academic and practical imperative (Elkington, 2013; Kassem et al., 2022; Choudhury & Srai, 2020).

Job satisfaction, a vital factor in both organizational success and employee well-being, has historically been examined within traditional industrial settings (Locke, 1976; Spector, 1997). In the automotive industry, however, it is increasingly shaped by job redesign due to automation, the obsolescence of certain skills, the need for digital proficiency, and organizational changes driven by sustainability (Pfeiffer, 2017; Totterdill, 2020; Lee et al., 2021). The adoption of green technologies and adherence to environmental standards, while creating new "green jobs," also bring about additional challenges, such as job security concerns, the necessity to adapt to digital tools, and the psychological effects of ongoing innovation (Bai et al., 2020; Fernández & Moldogaziev, 2021; Haddoud et al., 2023). As a result, employee satisfaction now hinges not only on traditional factors like salary, work environment, and managerial support but also on the organization's ability to handle technological advancements, provide learning opportunities, and integrate ecological principles into workplace practices (Yousef, 2017; Ren & Krumwiede, 2022).

Recent studies underscore the intricate relationship between digital transformation and human elements within automotive companies. While automation and digitalization can boost satisfaction by alleviating repetitive tasks and enhancing workplace safety, they might also lower satisfaction due to heightened surveillance, decreased autonomy, and the constant need for skill development (Frey & Osborne, 2017; Müller et al., 2019; Acatech, 2021). Likewise, sustainability transitions

pose a dual challenge: balancing ecological performance with the protection of social well-being (Choudhury & Srai, 2020; Pagell & Wu, 2009). As automotive companies embrace electric mobility and eco-friendly manufacturing, they must align environmental goals with human resource strategies that promote engagement, job satisfaction, and organizational resilience (Lee et al., 2021; Khan et al., 2020).

Although there have been advancements, the study of job satisfaction within the automotive industry remains disjointed, with research dispersed across fields such as management, industrial psychology, human resource development, environmental engineering, and operations research (Kraus et al., 2021; Donthu et al., 2021; Rojko, 2017). There is a scarcity of comprehensive analyses on how technological and sustainability changes together impact employee satisfaction. Additionally, there is an absence of a systematic overview of the intellectual framework and thematic progression in this area, which limits researchers' ability to pinpoint gaps, identify emerging trends, and find opportunities for collaboration (Wang et al., 2022; Hair et al., 2022).

The current study uses bibliometric and network analysis to examine global automotive job satisfaction research from 2011 to 2025 to close this gap. This study uses Scopus and VOSviewer to identify field-influencing theme clusters by visualizing publication, co-authorship, and keyword co-occurrence patterns. The study synthesizes knowledge and promotes sustainable industrial transformation research by considering technological, environmental, and human factors.

This bibliometric evaluation illuminates how digitalization, automation, and sustainability transitions affect worker satisfaction and organizational resilience, improving academic research and industrial practices. It lays the groundwork for policymakers and business leaders to craft evidence-based strategies that facilitate workforce adaptation, improve job quality, and promote sustainable growth in the swiftly changing automotive sector. Utilizing a thorough bibliometric and network analysis approach, the study offers a detailed, reproducible, and unbiased overview of the scientific landscape, shedding light on publication trends, authorship dynamics, thematic developments, and collaborative networks within automotive research (Donthu et al., 2021; Aria & Cuccurullo, 2017; van Eck & Waltman, 2010).

Research Questions

1. Who are the main authors and institutions working on job satisfaction in the automotive sector, and how much collaboration exists among them?
2. What are the main themes and keywords studied in relation to job satisfaction, technology, and sustainability in the automotive industry?
3. Which countries have contributed most to this research, and how are they connected through international collaboration?

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Methodology

1. Research Design

A quantitative descriptive research approach was employed to examine the structure and dynamics of the current literature. Bibliometric analysis is especially useful for pinpointing research trends, key authors, leading institutions, and collaboration networks within a specific field (Donthu et al., 2021). The study also uses network analysis to examine keyword, co-author, and co-cited reference relationships to understand the subject's intellectual and conceptual foundations.

2. Data Source and Retrieval

Scopus, noted for its wide range of peer-reviewed scholarly publications, provided the bibliographic data (Falagas et al., 2008). The search took place in August 2025, utilizing a combination of pertinent keywords:

("Job satisfaction" OR "employee satisfaction" OR "workplace well-being") AND ("automotive sector" OR "automobile industry" OR "vehicle manufacturing") AND ("technological change" OR "digital transformation" OR "Industry 4.0" OR "automation" OR "AI") AND ("sustainability" OR "green jobs" OR "environmental transition" OR "sustainable mobility")

The study focused on the years 2011 to 2025, a period marked by the growing importance of discussions on digital transformation and sustainability within the automotive industry.

3. Data Screening and Refinement

The initial search resulted in 238 records. A systematic screening process was implemented to ensure the data's relevance and quality. The following exclusion criteria were applied:

Duplicate entries were eliminated through the use of Scopus filters and manual checks. Non-English documents, editorials, conference summaries, and materials not subjected to peer review were excluded. Studies that did not specifically focus on job satisfaction or workforce issues within the automotive sector were also removed.

After applying these criteria, **122 documents** were retained for final bibliometric analysis. The dataset included articles, reviews, and book chapters to ensure comprehensive coverage.

4. Data Analysis Tools and Techniques

Data analysis was conducted using **VOSviewer (version 1.6.20)** and **Microsoft Excel**.

- **VOSviewer** was employed to perform co-authorship, co-citation, and keyword co-occurrence analyses, facilitating visualization of collaboration patterns and thematic clusters (van Eck & Waltman, 2010).

- Descriptive statistics, including trends in publications, types of documents, and citation rates, were calculated using Excel.

Three major types of bibliometric mapping were performed:

1. **Co-authorship analysis** – Identify author, institution, and country collaborative networks.
2. **Co-citation analysis** – to identify this academic field's most significant journals and authors.
3. **Keyword co-occurrence analysis** – to reveal thematic evolution and research hotspots related to job satisfaction, technological innovation, and sustainability.

5. Thematic and Temporal Analysis

The study not only focused on mapping networks but also explored temporal trends to track changes in research priorities over time. By analyzing keywords in chronological order, the study identified the rise of new topics such as automation, digital HRM, AI-driven production, reskilling, green jobs, and sustainable mobility. This approach demonstrated how the notion of job satisfaction has developed in response to technological and environmental changes.

6. Validation and Reliability

To ensure the **validity and reliability** of results, the following steps were taken:

- Two researchers independently confirmed the search strategy and inclusion criteria.
- Each publication's relevance was verified through a manual review of its titles, abstracts, and keywords.
- The consistency of bibliometric mapping was confirmed by conducting analyses again with the same settings in VOSviewer.

7. Ethical Considerations

The study uses only Scopus secondary data. There were no human participants; thus, ethical approval was unnecessary. Nonetheless, academic integrity and proper citation practices were adhered to when using and reporting bibliographic data.

RESULT

Co-Authorship Author Analysis

The analysis of co-authorship identified 348 authors who met the criteria, highlighting the extensive and varied academic involvement in this field of study. Although there is a large number of contributors, most authors have only worked together on a single paper, suggesting a fragmented pattern of authorship and a lack of enduring collaborative networks. Only a handful of authors, such as Krishnan L.R.K. (4 documents) and Sundarrajan Poorani (3 documents), have shown consistent contributions, indicating ongoing engagement with the subject. Citation data reveal that

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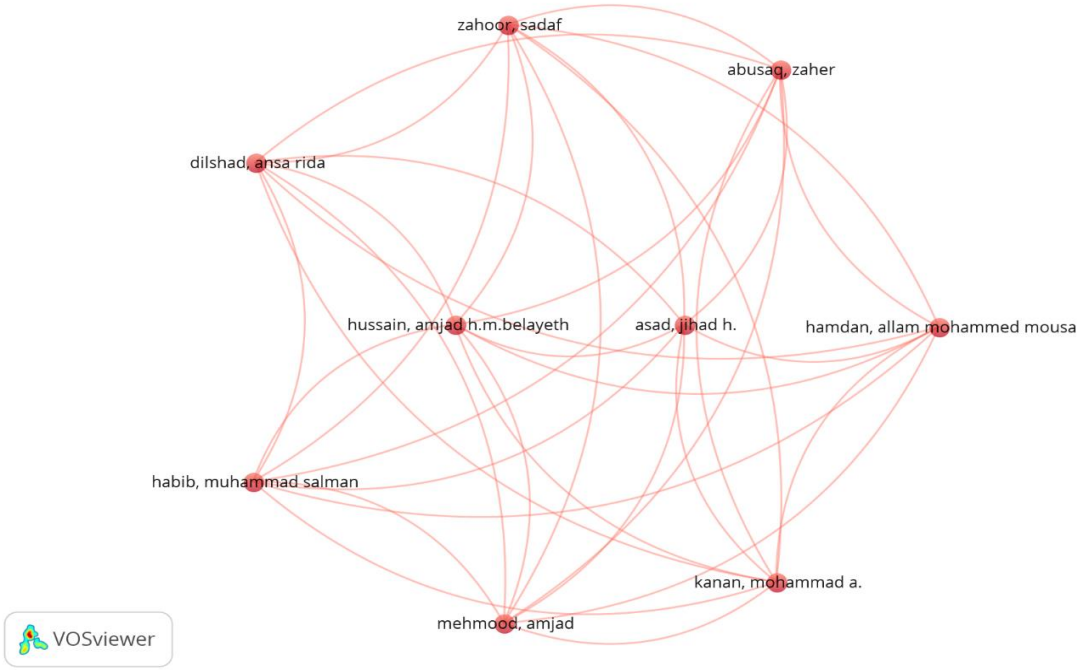
authors like Engert, Sabrina, and Baumgartner, Rupert J., have had the greatest impact, each receiving 230 citations, while others like Huang, Yueng-Hsiang Hsiang, and Robertson, Michelle M. have gained significant recognition with 224 citations, highlighting their influential work in this area. The total link strength values varied widely, indicating that while there are cross-institutional and interdisciplinary collaborations, they are relatively limited in intensity. Overall, the co-authorship network highlights a growing but dispersed research community, where knowledge production is becoming more global but still marked by limited author connectivity and depth of collaboration.



Rank	Author Name	Affiliation University	Country	No. of Articles	Total Citations	Average citation per paper
1	Engert, Sabrina	Institute of Systems Sciences, Universität Graz, Graz	Austria	1	230	230.00
2	Baumgartner, Rupert J.	Institute of Systems Sciences, Universität Graz, Graz	Austria	1	230	230.00
3	Huang, Yueng-Hsiang Hsiang	Liberty Mutual Research Institute for Safety, Boston	United States	1	224	224.00
4	Lee, Jin	Liberty Mutual Research Institute for Safety, Boston	United States	1	224	224.00
5	McFadden, Anna C.	Liberty Mutual Research Institute for Safety, Boston	United States	1	224	224.00

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The table shows that influence in this dataset is heavily concentrated in a few landmark papers: each of the top five authors is credited with only one recorded article, yet that single work has earned very high citation counts, driving their prominent positions. Two institutions — the Institute of Systems Sciences at Universität Graz and the Liberty Mutual Research Institute for Safety — appear repeatedly among these top names, suggesting that particular research groups or collaborations produced the high-impact outputs. Geographically, the leading contributors come from Austria and the United States, which may reflect where influential projects or publishing networks in this topic are centered. It is important to note that the ranking uses full counting (each coauthor receives full credit for a paper's citations), so coauthorship on a highly cited article inflates individual totals; applying fractional counting, author-ID disambiguation, or complementary measures such as h-index and multi-year citation trends would give a more balanced picture of sustained scholarly influence.

Co-Occurrence Analysis of Keywords in Automotive, Occupational Safety, and Organizational Research

The analysis of 1,014 keywords offers a detailed snapshot of the research landscape across the fields of automotive, occupational safety, human resource management, and technology. The biggest problem is "job satisfaction" (41 times, 725 links), highlighting its importance in employee well-being and organizational outcomes studies. Closely associated terms include "workplace" (5 occurrences, link strength 167), "workload" (4 occurrences, 151), "employee engagement" (8 occurrences, 102), "automation" (6 occurrences, 127), and "sustainable development" (7 occurrences, 109), which illustrate the intersection of human factors, operational efficiency, and sustainability. Keywords specific to the automotive sector, such as "automobile driving" (7 occurrences, 281), "car driving" (8 occurrences, 315), "automotive industry" (10 occurrences, 123), and "truck drivers" (4 occurrences, 139), highlight a focus on driver behavior, safety, and operational performance within the industry. Occupational safety emerges as another significant theme, with keywords like "safety" (5 occurrences, 189), "occupational accident" (2 occurrences, 89), "driver safety" (2 occurrences, 82), "occupational exposure" (2 occurrences, 82), and "musculoskeletal disorders" (1 occurrence, 48) collectively emphasizing concerns about workplace hazards and ergonomic issues. Technological elements, particularly "automation," "artificial intelligence" (2 occurrences, 10), "machine learning" (2 occurrences, 10), "autonomous vehicles" (3 occurrences, 48), and "digitalization" (4 occurrences, 29), underscore the role of emerging technologies in boosting operational efficiency and supporting human work. Keywords like "human resource management" (8 occurrences, 178), "motivation" (8 occurrences, 115), "leadership" (2 occurrences, 32), and "organizational culture" (4 occurrences, 86) show academic interest in employee management practices and leadership styles. Sustainability and environmental concerns are represented by keywords like "sustainability" (4 occurrences, 57), "environmental impact" (2 occurrences, 23), "greenhouse gas" (1 occurrence, 10), and "green supply chain management" (1 occurrence, 3), indicating a growing focus on eco-friendly and responsible practices. Overall, the co-occurrence patterns reveal a multi-faceted research focus that integrates occupational safety, employee behavior, technological advancement, automotive industry

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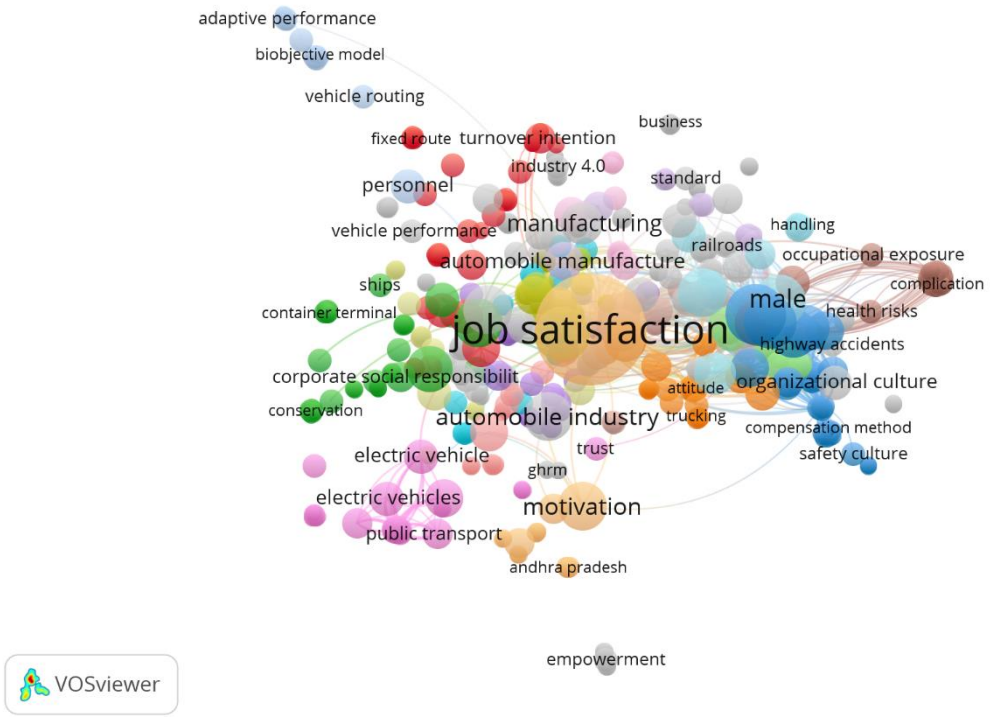
challenges, and sustainable practices, offering a comprehensive view of the interconnected themes in scholarly literature.



Citation Analysis of Selected Publications on Job Satisfaction in the Automotive Sector

The 122 documents in this study's citation analysis show the academic effect and influence of work satisfaction research in the automobile industry amid technological and sustainable advancements. Among these publications, a few stand out due to their high citation numbers, signifying notable recognition in the academic community. For example, Engert (2016) and Huang (2016) have been cited 230 and 224 times, respectively, underscoring their essential contributions to understanding the effects of technology and sustainability on workforce dynamics. Other frequently cited works include Chen (2015) with 92 citations, Wilson (2020) with 63, Globisch (2018) with 61, and Song (2019) with 60, indicating a continued interest in factors affecting employee engagement, motivation, and organizational outcomes. Additionally, Palacios-Manzano (2024) has garnered significant attention with 37 citations, suggesting that recent research is increasingly addressing modern challenges in the automotive field. The citation distribution shows that while many recent studies (e.g., Zhao, 2025; Schnücker, 2025; Sousa, 2025) have not yet accumulated citations due to their newness, older publications continue to influence ongoing discussions. The analysis also highlights that some documents have few or no citations, pointing to emerging or niche research areas that have yet to gain widespread attention. Overall, the citation analysis highlights a dynamic field where foundational studies lay the groundwork for current research into technological

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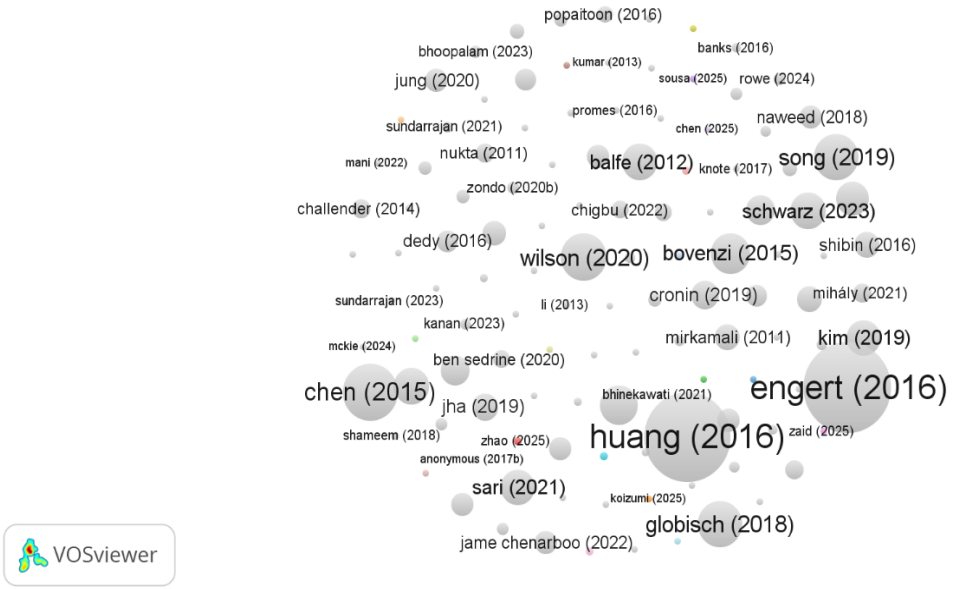
integration, sustainability practices, occupational safety, and human resource management, while newer studies gradually expand the knowledge base in the automotive sector.



Bibliographic Coupling Analysis of Countries in Job Satisfaction Research in the Automotive Sector

The bibliographic coupling analysis of automotive work satisfaction studies from 42 countries reveals intriguing academic collaboration and influence. The US is the top contributor, with 17 documents receiving 435 citations and 178 total links, indicating strong international research collaboration. India has 23 documents with 87 citations and 92 links, indicating active participation in collaborative research networks. China is close behind with 8 documents, 105 citations, and 89 links, demonstrating its growing influence. The UK (9 documents, 190 citations, link strength 61), Australia (7 documents, 166 citations, link strength 79), and Malaysia (7 documents, 69 citations, link strength 80) also contributed, highlighting their regional research prominence and international collaborations. Germany (7 documents, 84 citations, link strength 23), Italy (4 documents, 95 citations, link strength 31), and Austria (1 document, 230 citations, link strength 1) also contribute, but their link strengths vary due to network integration. Countries with fewer documents, like Bahrain, Bangladesh, and Palestine, exhibit high link strength relative to their output, suggesting strategic collaboration or citations in influential studies. The analysis shows that automotive work satisfaction research is concentrated in a few high-impact nations, with significant international cooperation supporting knowledge transmission and cross-country influence. The US, India, China, and the UK are global research hubs, while other countries contribute selectively through specialized or collaborative initiatives. This shows the global interest in automotive job satisfaction and the uneven distribution of research and collaboration strength across countries.

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Rank	Country	Total Publication	Total Citation	Average Citation per Paper
1	United States	17	435	25.59
2	Israel	2	239	119.50
3	Austria	1	230	230.00
4	United Kingdom	9	190	21.11
5	Australia	7	166	23.71
6	Japan	3	107	35.67
7	China	8	105	13.12
8	Italy	4	95	23.75
9	India	23	87	3.78
10	Germany	7	84	12.00

The pattern suggests that a few high-impact papers—not broad research programs—are inflating Austria's and Israel's averages, while the U.S. combines both volume and influence. India's large output but low average implies wide engagement but fewer standout works; boosting international collaboration and focus on novel, well-disseminated studies could raise impact. Finally, because averages hide extremes, checking median citations or using fractional counting would show whether the influence is widespread or driven by isolated hits.

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Conclusion

This bibliometric review indicates that research on automotive sector job satisfaction is anchored by the interplay of digital transformation and sustainability transitions. Keyword co-occurrence mapping positions "job satisfaction" as a central node linked with concepts like automation, upskilling/reskilling, AI-driven production, digital HRM, and green mobility. Recent publications have focused on Industry 4.0 technology and environmental issues, reflecting increased study on AI, automation, and sustainable mobility. The co-authorship and country-level networks reveal a globally growing yet dispersed research community: a few nations (notably the US, India, China, and the UK) dominate output and serve as central hubs, while collaboration links remain limited overall. This uneven distribution underscores that, despite broad international interest, research collaborations and knowledge exchange are still fragmented.

Together, these findings underscore how technological and environmental shifts are reshaping the determinants of job satisfaction. For example, the adoption of green technologies has produced new "green jobs" but also introduced challenges (skill obsolescence, job insecurity, and the psychological effects of innovation). Consequently, employee satisfaction increasingly depends on how organizations manage these transitions – including providing learning opportunities and aligning practices with ecological values. The analysis concludes that future research should focus on the psychosocial effects of automation and global workforce dynamics, and policymakers should use these findings to develop evidence-based strategies like reskilling programs and sustainable HRM policies to help workers adapt and maintain job quality in the automotive industry's rapid transformation.

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