

## **Problem-Based Learning and Sustainable Practices in the Halal Industry: A Bibliometric Approach**

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### **ABSTRACT**

This paper provides a bibliometric analysis of the relationship between problem-based learning (PBL) and sustainable practices in the halal industry. The study reviews academic publications to explore how PBL can support the development of a borderless halal ecosystem that is resilient, innovative and sustainable. By engaging learners in problem-solving activities related to the halal industry. This study utilizes bibliometric analysis to systematically review and analyze a large corpus of academic literature related to problem-based learning (PBL) and sustainable practices in the halal industry. The dataset comprises peer-reviewed journal articles publications retrieved from Scopus database. Key bibliometric indicators such as publication count, citation analysis, keyword frequency and co-authorship networks are examined to uncover trends and patterns. Additionally, the study highlights the growing collaboration between academics and practitioners, as evidenced by the co-authorship networks. PBL promotes the development of critical thinking, ethical decision-making, and sustainability awareness. The research highlights the potential of PBL to drive innovation and resilience in the halal sector through education. This study contributes to the PBL and halal literature by providing a comprehensive overview by mapping out the trends and identifying emerging patterns, which offers valuable insights for both researchers and practitioners. The bibliometric approach also sets a precedent for similar reviews in other domains, demonstrating the utility of such analyzes in understanding scholarly developments and guiding future investigations.

Keywords: Bibliometric, Halal, Innovative, PBL, Resilience, Sustainable.

### **INTRODUCTION**

Problem-Based Learning (PBL) is an instructional approach that leverages real-world problems as a context for learners to develop essential skills, including self-directed learning, teamwork, and problem-solving (Martin et al., 2005). This method is particularly effective in fostering lifelong learning, a critical capability in today's rapidly evolving world (Sung et al., 2010). Incorporating PBL into educational frameworks not only enhances academic achievement in the short term but also instills critical thinking, adaptability, and collaboration skills, preparing learners for the complexities of modern life and the workplace (Shin et al., 1993; Imam & Cleland, 2020). This synergy between PBL and lifelong learning is pivotal for nurturing individuals capable of thriving in an ever-changing global environment.

PBL's emphasis on active, learner-centered engagement makes it especially valuable in developing lifelong learning skills and competencies. By immersing learners in real-world

challenges, PBL promotes critical thinking, teamwork, and intrinsic motivation, enabling individuals to grow both personally and professionally (Tunca et al., 2019). The collaborative nature of PBL enhances communication and interpersonal skills through group discussions and shared problem-solving efforts, building a strong sense of community and equipping learners with essential skills for personal and professional success (Martin, 2019). Furthermore, research shows that PBL enhances long-term knowledge retention more effectively than traditional lecture-based approaches, making it ideal for adult learners who require sustained application of knowledge in their careers.

In the context of sustainable practices in the halal industry, PBL emerges as a transformative educational approach. This paper applies bibliometric analysis to explore how PBL supports the development of a resilient, innovative and sustainable halal ecosystem. The study systematically examines a large corpus of academic literature, focusing on key metrics such as publication count, citation analysis, and co-authorship networks to identify trends and patterns in the field. By integrating PBL into learning experiences related to the halal industry, learners engage in problem-solving activities that foster critical thinking, ethical decision-making, and sustainability awareness.

The bibliometric analysis highlights the growing collaboration between academics and practitioners, reflecting PBL's practical and collaborative nature. This integration drives innovation and resilience in the halal sector through education, underscoring PBL's potential to address contemporary challenges while aligning with sustainability goals. By mapping trends and identifying emerging patterns, the study provides valuable insights for researchers and practitioners alike. Additionally, the bibliometric approach sets a foundation for future investigations in related domains, showcasing PBL's utility in fostering sustainable development and lifelong learning across diverse contexts.

## **METHODOLOGY**

The term "bibliometrics" was first introduced by Alan Pritchard in his 1969 paper titled "Statistical Bibliography or Bibliometrics" (Andres, 2009; Gingras, 2016; Pritchard, 1969). According to Zupic and Čater (2015), bibliometric methods have since been widely used to examine scholarly publications. Among the most commonly used academic databases are Google Scholar, Web of Science (WOS), and Scopus. This study utilized Scopus as the data source for three main reasons: first, Scopus applies consistent criteria for document selection; second, it offers a broader collection of documents, especially in the fields of social science and education, compared to the Web of Science (Hallinger & Nguyen, 2020); and third, Scopus provides more advanced tools for exporting bibliographic data compared to Google Scholar (Hallinger & Nguyen, 2020). Additionally, bibliometric approaches effectively analyze the evolution and structural composition of a knowledge base (White & McCain, 1998).

The search process followed the Modified Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Zakaria et al., 2020). For the Scopus database search on July 16, 2024, the query used was: ( TITLE-ABS-KEY ( "problem based learning" OR "PBL" ) AND TITLE-ABS-KEY ( "sustainability" OR "halal" ) ) AND PUBYEAR > 2019 AND PUBYEAR < 2025 AND ( LIMIT-TO ( LANGUAGE , "English" ) ) AND ( LIMIT-TO ( DOCTYPE , "ar" ) ) AND ( LIMIT-TO ( SRCTYPE , "j" ) ).

This search identified 131 documents related to problem-based learning, sustainability, and the halal industry, focusing on trends and developments between 2019 and 2024. The findings provide valuable insights into the intersection of PBL and sustainable practices within the halal ecosystem to answer three following research questions:

RQ1: What is the research trend based on the year of publication on Problem-Based Learning and Sustainable Practices in the Halal Industry?

RQ2: What countries those were actively involved in publications related to Problem-Based Learning and Sustainable Practices in the Halal Industry?

RQ3: Which are the most influential articles on Problem-Based Learning and Sustainable?

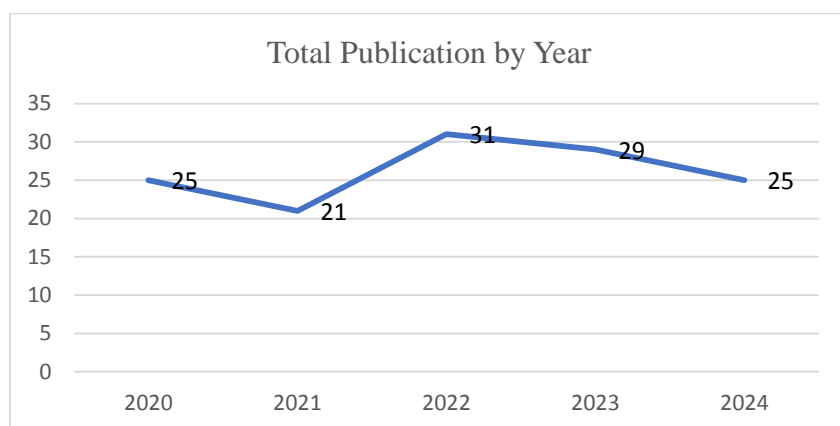
## **FINDINGS AND DISCUSSION**

### **Publication by Year**

The pattern of research publications on Problem-Based Learning (PBL) and Sustainable Practices in the Halal Industry from 2020 to 2024, as shown in the graph (Figure 1), demonstrates a fluctuating trend. In 2020, there were approximately 25 publications, followed by a slight decline in 2021.

#### **Figure 1**

*Total Publication by Year on Problem-Based Learning (PBL) and Sustainable Practices in the Halal Industry*



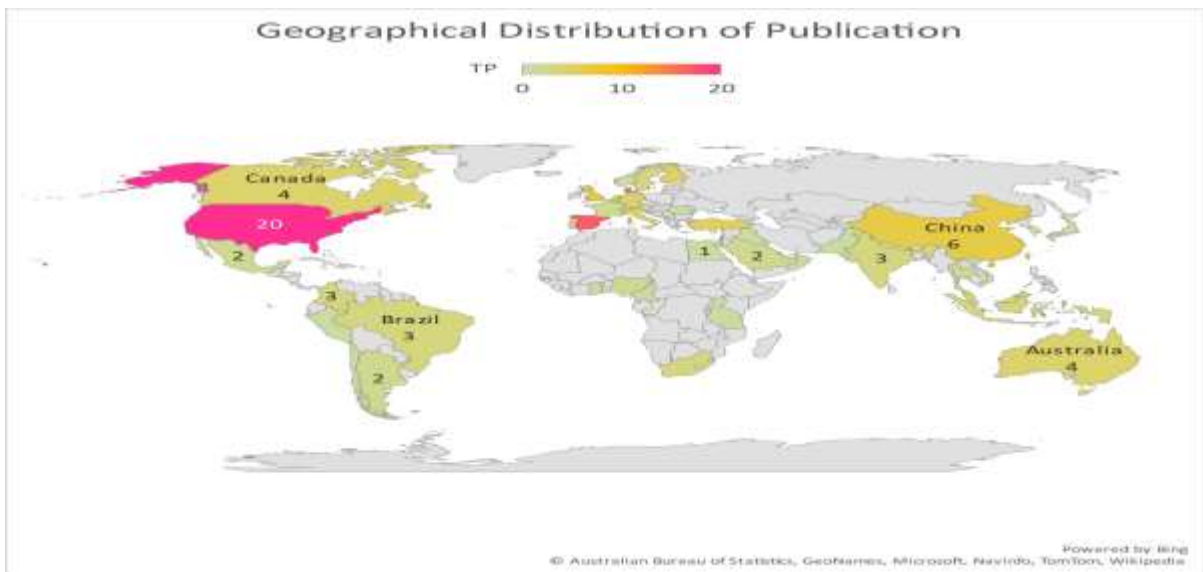
The number of publications rose significantly in 2022, reaching a peak of over 30. However, from 2023 onwards, the trend shows a gradual decline in publications, though still maintaining around 25 by 2024. This research trend based on the year of publication answered the first research question which suggests a growing interest in the topic, particularly between 2021 and 2022, followed by stabilization in recent years.

### **Geographical Distribution of Publications**

The geographical distribution of publications related to Problem-Based Learning (PBL) and sustainable practices in the Halal industry (refer Figure 2) shows that the United States leads with 20 publications, indicating strong research activity in this area. Other countries with notable contributions include China with 6 publications, Canada and Australia each with 4,

and Brazil with 3. European and Middle Eastern countries such as Spain (1), Saudi Arabia (2), and Malaysia (3) also contribute to the research. The map suggests that research on PBL and sustainable practices in the Halal industry is being conducted globally, with significant activity in North America, Asia, and parts of Europe and South America. However, there are regions like Africa and parts of Eastern Europe with little to no contributions to this field.

**Figure 2**  
 Countries Actively Involved in Publications on Problem-Based Learning (PBL) and Sustainable Practices



**Most Influential Articles on Problem-Based Learning and Sustainable**

The data in Table 1 shows that the majority of publications on Problem-Based Learning (PBL) and sustainable practices are concentrated in Sustainability Switzerland, which accounts for 22.14% of the total, indicating strong research interest in sustainability from an interdisciplinary perspective.

**Table 1**  
 Top Ten Influential Articles on Problem-Based Learning and Sustainable

No	Author Name	Year	Title of Article Paper	Total Citations	Affiliation	Country
1	Elzainy, A.,	2020	Experience of e-learning and online assessment during the COVID-19.....	161	Cairo University	Cairo
2	Cebrián, G.	2020	The smart classroom as a means...	79	Universitat Rovira	Spain
3	Tasdemir, C.	2020	Integrating sustainability into higher education ...	57	Elsevierknik Üniversitesi	Turkey

4	McWhirter, N.	2020	Case-based flipped classroom approach ...	38	Virginia Tech College of Engineering	United States
5	Doukanari, E	2021	The quest for sustainable teaching ...	35	University of Nicosia	Cyprus
6	Martínez Casanovas	2022	Higher education: The best practices...	31	Universitat Pompeu	Spain
7	Neves, R. M.	2021	Teacher competences for active learning...	27	Universidade Federal do Pará	Brazil
8	Jääskä, E.	2021	Game-based learning in project sustainability...	26	Oulun Yliopisto	Finland
9	Bertel, L. B	2022	Framing and facilitating complex problem-solving ...	24	Aalborg University	Denmark
10	Charania, A.	2021	Constructivist teaching and learning with ..	24	Tata Institute of Social Sciences	India

Other notable contributors include the Journal of Problem Based Learning in Higher Education (6.87%) and the International Journal of Sustainability in Higher Education (5.34%), reflecting a focus on PBL's role in fostering sustainability within educational settings. Publications are also present in specialized fields such as engineering and chemistry, suggesting that PBL is being explored as a tool for addressing sustainability challenges in technical disciplines. Additionally, journals in areas like public health, construction, and environmental research contribute smaller shares, highlighting PBL's broad applicability across various sectors to promote sustainable development.

The table presents a list of authors who have contributed to research related to Problem-Based Learning (PBL) and sustainable practices in education, with a focus on articles published between 2020 and 2022. The top author, Elzainy (2020), from Cairo University, has garnered the highest total citations (161) for his work on e-learning and online assessments during the COVID-19 pandemic. Cebrián (2020) from Universitat Rovira, Spain, has a notable contribution with 79 citations for his work on smart classrooms. Authors from various countries, including Turkey, the United States, Cyprus, and Finland, are represented, highlighting the global interest in sustainable education and PBL. Notably, McWhirter (2020) from Virginia Tech and Doukanari (2021) from the University of Nicosia have explored flipped classrooms and sustainable teaching, respectively, receiving significant recognition with 38 and 35 citations. These articles reflect a diverse and growing body of research connecting PBL, sustainability, and innovative teaching practices across various higher education settings.

The findings presented highlight significant contributions from various authors to the fields of Problem-Based Learning (PBL) and sustainable practices in education, particularly in higher education. The research is geographically diverse, with contributions from countries such as Egypt, Spain, Turkey, the United States, Cyprus, Finland, Denmark, and India. This geographic spread demonstrates the global relevance of PBL and sustainability in education, with diverse academic and cultural contexts shaping the approaches and outcomes of the studies.

Elzainy's work (2020) from Cairo University, which focuses on e-learning and online assessment during the COVID-19 pandemic, is the most highly cited, reflecting the increased importance of digital education tools and remote learning methods during and post-pandemic. This suggests a growing interest in leveraging technology in teaching methodologies, especially in challenging circumstances, such as during global health crises. It also underscores the necessity of adapting PBL to digital environments to maintain effective student engagement and learning outcomes.

The contributions from Spain, particularly Cebrián's (2020) research on smart classrooms, demonstrate the integration of technological advancements into the learning environment, a theme that is increasingly intertwined with PBL. Smart classrooms and other technological innovations can serve as enablers for more interactive and problem-solving-oriented learning approaches. This aligns with sustainable practices, as students are encouraged to engage with real-world problems in technologically advanced settings, preparing them for the challenges they will face in professional contexts.

McWhirter's (2020) exploration of case-based flipped classrooms, as well as other research like Tasdemir's (2020) integration of sustainability into higher education curricula, highlight the practical application of PBL. These studies underscore the value of PBL in making education more relevant to real-world challenges, particularly sustainability. The focus on flipped classrooms and active learning suggests that moving away from traditional lecture-based models can enhance the learning experience by fostering critical thinking and problem-solving skills, which are essential in addressing sustainability challenges.

Additionally, the studies from Neves (2021) and Jääskä (2021), which focus on teacher competencies and game-based learning, respectively, suggest that the role of educators in facilitating PBL and sustainability education is crucial. Teacher competencies need to be developed to effectively guide students in active learning environments, while innovative techniques such as game-based learning can enhance engagement and improve learning outcomes.

## **CONCLUSION**

The findings from this bibliometric analysis of Problem-Based Learning and sustainable practices in education reflect a growing emphasis on integrating technological advancements and real-world problem-solving into educational frameworks. The diverse geographic representation and the range of topics covered such as e-learning, smart classrooms, flipped learning, and game-based learning highlight the multifaceted nature of PBL as a teaching approach. This research has important implications for future studies, suggesting that there is a need to further explore the role of technology in facilitating PBL, particularly in addressing sustainability challenges. Additionally, future research could focus on developing teacher competencies and designing educational frameworks that support the practical application of PBL in both traditional and digital learning environments. These findings contribute to a deeper understanding of how PBL can be leveraged to foster critical thinking, collaboration, and innovation in addressing global challenges like sustainability, and offer a roadmap for enhancing educational practices to meet the needs of the future.

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