

Measuring Social Media Performance Efficiency of High-Impact Library and Information Science Journals: a Data Envelopment Analysis Approach

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Notes

Submitted: 10-04-2026

Revised: 09-06-2026

Accepted: 30-07-2026

How to cite: Putri, S. R. A., Ibrahim, C., Kurnianingsih, I., & Kangko, D. D. (2026). Measuring Social Media Performance Efficiency of High-Impact Library and Information Science Journals: A Data Envelopment Analysis Approach. *Khizanah Al-Hikmah : Jurnal Ilmu Perpustakaan, Informasi, Dan Kearsipan*, 14(3).
<https://doi.org/10.24252/kah.v14i3a2>

DOI: [10.24252/kah.v14i3a2](https://doi.org/10.24252/kah.v14i3a2)

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ABSTRACT

Background: The connection between social media and scholarly communication has become a vital instrument for expanding knowledge dissemination. However, the effectiveness of digital utilization by academic Library and Information Science (LIS) journals has not been maximally measured, leaving a gap in understanding how well these journals leverage social platforms to amplify their research impact.

Purpose: This study aims to evaluate the social media performance efficiency of reputable LIS journals (SJR > 1) by measuring how effectively academic inputs are converted into digital visibility outputs.

Methods: The study employs Data Envelopment Analysis (DEA) using the BCC-Output Oriented model. Ten selected LIS journals were analyzed as Decision Making Units (DMUs). Input variables included the Article Processing Charge (APC), H-Index, and number of citations, while output variables consisted of mentions on X (Twitter) and Facebook.

Findings: The results revealed a clear performance polarization: 50% of the journals (5 DMUs) achieved perfect efficiency (score 1.00), while the remaining 50% were inefficient in converting academic resources into digital visibility. Additionally, X (Twitter) emerged as the dominant dissemination platform compared to Facebook.

Originality/Value: This study offers a novel efficiency-based approach to assessing social media performance among high-impact LIS journals, an area previously unmeasured through quantitative benchmarking. It provides actionable recommendations for publishers, notably the appointment of dedicated social media editors, to strengthen the digital reach and broader impact of LIS research.

Keywords: Social media performance; Data Envelopment Analysis; Library and Information Science (LIS) journals; Scholarly communication

1. INTRODUCTION

Social media has functioned as a daily communication tool, but its role has progressively expanded into the academic sphere, becoming an integral part of modern society (Tuten et al., 2015). Academics are now encouraged to utilize social media to broaden public participation and reach non-academic circles (Jordan, 2023). Furthermore, journal management and editorial teams utilize these platforms to make knowledge more accessible to a wider audience. This is supported by Zheng et al. (2019), who demonstrated that social media has been widely adopted in journal governance over the past decade to promote and disseminate knowledge. To optimize this dissemination, Pablo Dorta-González (2025) emphasizes the importance of exploring factors that influence audience attention toward research outputs on social media.

In addition to journal management, higher education institutions such as academic libraries have taken similar steps in scholarly communication. Libraries utilize platforms like X (Twitter) and Facebook to promote collections, events, and services (Kokke, 2024), while simultaneously disseminating information to strengthen the learning environment (Dhanavandan, 2023). Although libraries play a role in information distribution, academic journals remain the central subject and primary source of new ideas (Nedelcheva, 2024). However, the practical dissemination of research through social media remains suboptimal. While the Scopus database initially recorded 376 journals in the Library and Information Science (LIS) field, a significant number of institutions have not maximized social media as a primary dissemination tool (Gruzd et al., 2011). Evidence from this study's preliminary observation confirms this gap although all 18 elite LIS journals (SJR > 1) filtered for this evaluation maintain their own social media accounts, there are still some journals that completely lack traceable altmetric data. This proves that high academic ranking does not automatically translate to optimal digital dissemination strategies. Challenges such as staff shortages and budget constraints often act as barriers to effective digital strategies (Tejedor et al., 2025), even though social media optimization accelerates information access significantly compared to traditional methods (Price et al., 2023; Shujath, 2025).

In practice, not all platforms offer the same effectiveness for academic dissemination. Based on initial observations using the Altmetric Explorer, the utilization of X (Twitter) and Facebook yields higher attention metrics (mention rates) compared to other platforms. X facilitates microblogging that eases academic discourse, while Facebook offers a broad community reach. Conversely, platforms like LinkedIn showed no measurable promotional activity.

Caused by these dissemination challenges, evaluating social media performance is crucial. In the era of digital scholarly communication, massive investments in academic reputation and publication costs (Article Processing Charges or APC) although hybrid publishing options exist become a severe academic waste if not accompanied by effective public dissemination strategies. Therefore, it is necessary to formulate an evaluation of how well elite journals manage this dissemination. This study focuses its observation on LIS journals with a SCImago Journal Rank (SJR) score > 1. The SJR indicator is selected because it reliably presents a journal's impact by excluding self-citations and focusing on quality

citations (Jain et al., 2021). Considering the highest SJR in the LIS field reaches 3.507, a score > 1 decisively selects an elite group of journals with prestige and scientific impact proven to be above the global average (Vijayan & Renjith, 2021). This performance evaluation must be balanced against the academic resources the journals possess, represented by three primary input indicators: the H-index (Fraumann & Mutz, 2021), the Number of Citations (Ray et al., 2022), and the APC (Björk & Solomon, 2012).

To comprehensively evaluate these journal inputs against social media outputs, this research employs Data Envelopment Analysis (DEA). DEA is a non-parametric linear programming technique capable of evaluating the relative efficiency of Decision Making Units (DMUs) based on varied inputs and outputs (Duan et al., 2005). DEA measures efficiency relative to the best practice frontier (Sadri & Rostamy-Malkhalifeh, 2020), making it highly suitable for processing complex metrics that traditional statistical methods cannot easily resolve (Alkan et al., 2023).

Previous studies form an essential foundation for this quantitative evaluation. Petridis et al. (2013) applied DEA to measure journal efficiency, yet their focus was limited strictly to traditional academic quality metrics. Similarly, Ibrahim (2023) utilized DEA to measure general journal management efficiency, emphasizing operational and financial aspects such as traditional citation maximization. The similarity lies in the utilization of the DEA Banker, Charnes, Cooper (BCC) Output-Oriented model. However, the absolute difference and novelty of this study lie in its variable dimensions and evaluation focus. Unlike previous studies, this research evaluates post-publication digital dissemination efficiency by integrating alternative metrics (Altmetrics). The novelty lies in utilizing DEA to evaluate how optimally a journal converts past academic capital (APC, H-Index, citations) into current digital attention on social media among the most elite LIS journals ($\text{SJR} > 1$). An efficiency evaluation based on digital footprints in the LIS field has never been comprehensively conducted before, making this study exceptionally fascinating and critical for modern scientometrics.

To achieve this, the scope of this research is specifically limited to LIS journals indexed in Scopus. Scopus is exclusively selected due to its rigorous peer-review curation and as the sole source of SJR metric data (Meho & Rogers, 2008; Stahlschmidt & Stephen, 2019; Kirillova, 2017). Based on this urgency, the primary objective of this study is to quantitatively analyze the social media efficiency of Scopus-indexed LIS journals ($\text{SJR} > 1$) using the DEA BCC-Output Oriented model by measuring efficiency scores, slack movement, proportionate movement, and projection values. Through this model, the research does not merely generate numerical efficiency scores but serves as an instrument to extract the best practices of optimally performing journals. Ultimately, the implications of these findings are expected to provide a practical and evidence-based benchmark for journal publishers, librarians, and professional organizations to optimize their digital interactions and information reach to global audiences.

2. METHODS

The initial stage involved defining Library and Information Science (LIS) journals as the research subject (Figure 1). DEA evaluates a set of Decision Making Units (DMUs) that share similar characteristics. Using the Scopus database, 376 LIS journals were identified and grouped as candidate DMUs (Table 1). These candidates were subsequently filtered to exclude non-LIS categories and discontinued journals.

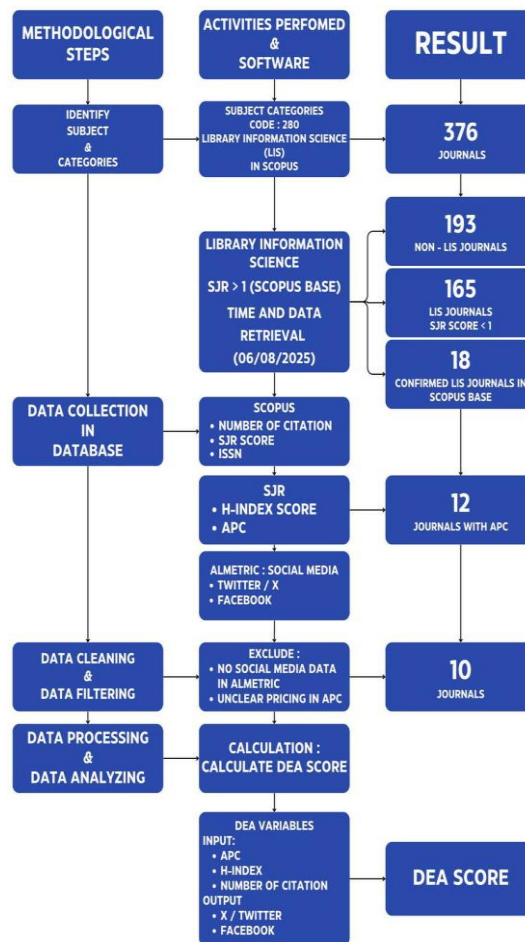


Figure 1. Methodological Charts

Table 1. DMUs And Journal's Names

Journal Name	Quartile	DMUs	SJR Score
Information Systems Research	Q1	1	4.85
European Journal of Information Systems	Q1	2	3.459
Journal of Information Technology	Q2	3	2.192
Information and Organization	Q3	4	1.803
IEEE Transactions on Information Theory	Q1	5	1.464
Information Systems Management	Q1	6	1.352
Journal of the Medical Library Association	Q1	7	1.348
Journal of Informetrics	Q1	8	1.321
Journal of the Association for Information Science and Technology	Q1	9	1.245
Ethics and Information Technology	Q1	10	1.107

A filtering process conducted on August 6, 2025, selected high-quality LIS journals. Initially, 376 journals were identified from the Scopus database. This procedure eliminated 193 non-LIS journals and 165 journals with an SJR score < 1, resulting in 18 elite candidate journals. From this filtered group, 6 journals were excluded for lacking complete Article Processing Charge (APC) transparency, and 2 journals were excluded due to a complete absence of Altmetric data. Ultimately, 10 journals were selected as the final Decision Making Units (DMUs).

Data collection involved gathering Input variables (APC, *H-Index*, Number of Citations) from the SJR and Scopus platforms. SJR is an impact metric that accounts for the reputation of the citing journals (González-Pereira et al., 2010). Ten journals successfully passed the APC selection criteria. Output variables (mentions on *X* and *Facebook*) were retrieved using *Altmetric Explorer*, a tool that tracks the online interactions of research outputs (Al-karadsheh et al., 2024). The final ten journals were then processed for DEA calculation, as detailed in Table 2.

Table 2. Output & Input Variables

Variable Type	
(I) Input	(O) Output
(I) H- Index	(O) X / Twitter
(I) APC	(O) Facebook
(I) Number of Citation	

Calculations were executed using *maxDEA* software. DEA evaluates the efficiency of DMUs by comparing their inputs and outputs (Dmitry & Valentina, 2020). This methodology establishes a shared efficiency frontier for all DMUs (Feng et al., 2024). The computational process included inputting the codes for the 10 DMUs, constructing the data tables, and applying the BCC-Output Oriented (BCC-O) model. The BCC model operates on the assumption that DMU efficiency varies based on the scale of operations (Benicio & Soares De Mello, 2020). Data compilation and organization were managed using Microsoft Excel.

The efficiency of the highest-ranking SJR LIS journals was assessed with a maximum score of 1.0, while scores < 1.0 were categorized as inefficient. Interpretation relied on *slack values* and *projection values*. A *positive slack* indicates a value that requires addition, whereas a *negative slack* signifies a value that must be reduced to attain the 1.0 efficiency projection target. Additionally, a positive *proportionate* value must be realized to meet the standard DEA efficiency target.

3. RESULTS AND DISCUSSION

This study evaluates the performance of the top 10 LIS journals by comparing input variables (journal capacity: APC, *H-index*, citations) and output variables (dissemination reach: *X* and *Facebook*). Data Envelopment Analysis (DEA) detects efficiency through the metrics of *slack movement*, *proportionate movement*, and *Projection Value*.

Table 4. Input Variables

DMUs	APC	H-Index	Number of Citation
1	\$3000	185	214.091
2	\$3240	52	22.230

3	\$3400	13	1.144
4	\$3590	75	20.769
5	\$2645	304	455.259
6	\$3650	67	28.218
7	\$0	70	29.527
8	\$3220	90	62.581
9	\$3310	165	42.593
10	\$3090	72	26.034

Table 5. Output Variables

DMUs	X / Twitter	Facebook
1	1.120	66
2	1.028	23
3	60	4
4	83	0
5	5.277	88
6	197	2
7	4.985	235
8	9.634	223
9	11.861	171
10	6.678	46

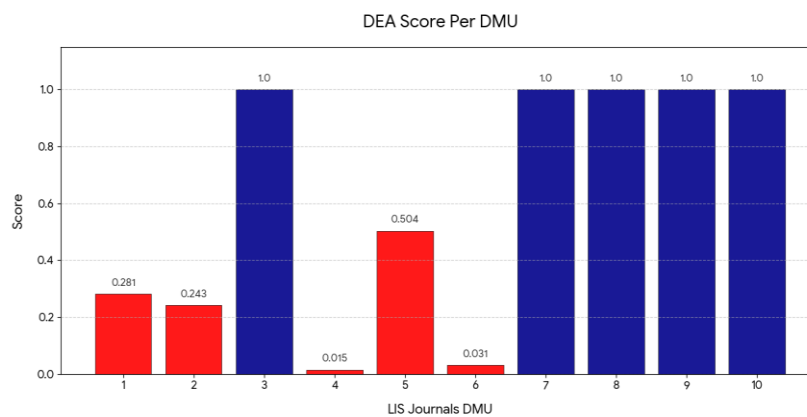


Figure 2. The Efficient Score of DEA

The efficient score distribution (Figure 2) shows that 50% of the DMUs (5 journals) achieve perfect efficiency (1.00), while the remaining 50% vary below the efficient value. This reflects a sharp disparity in the management of social media reputation among LIS journals.

Analysis of the Inefficiency Causes

The inefficiency of these five journals primarily stems from their inability to maximize digital visibility despite possessing substantial academic resources. The presence of output slacks indicates a significant gap between their high traditional metrics and their low social media engagement. To point to the root causes of this inefficiency, a detailed evaluation of each variable is required. The following section breaks down these specific factors, starting with the Article Processing Charge (APC), to identify areas where the journal's academic investments failed to translate into optimal digital visibility.

APC (I) Analysis

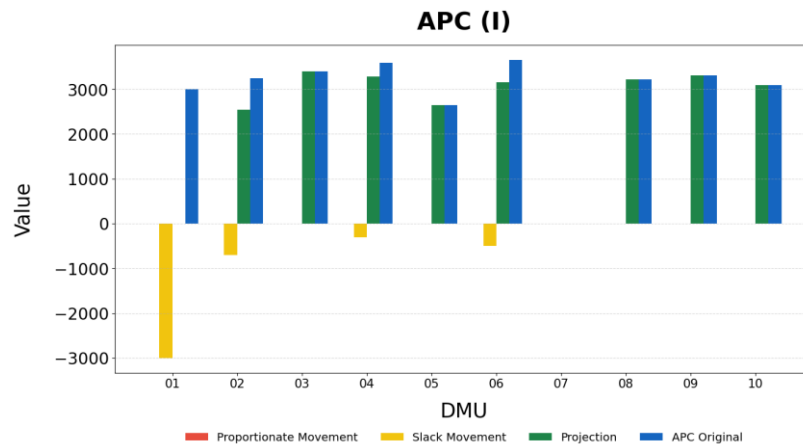


Figure 3. DMU 1-10 APC (I)

The visualization in Figure 3 identifies APC cost efficiency through the *Slack Movement* indicator. The results show that 6 out of 10 journals have set efficient costs. Conversely, the other 4 journals, including the *European Journal of Information Systems* (DMU 02) and *Information and Organization* (DMU 04), exhibit a *Negative Slack*. This indicates that the APC costs of these journals are excessively high and need to be reduced to match the DEA projection target, without requiring value addition (*Positive Slack*) or proportionate shifting.

H-Index (I) Analysis

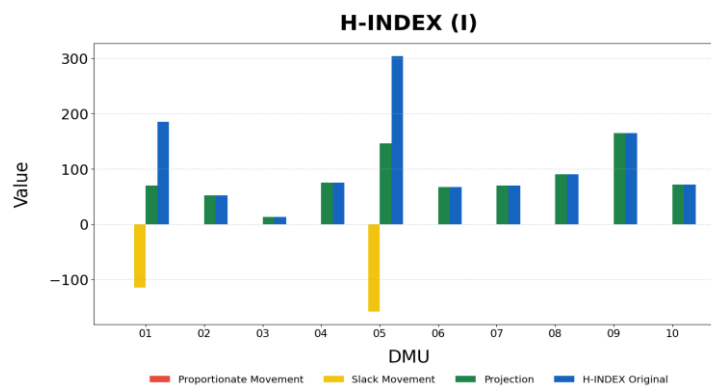


Figure 4. DMU 1-10 H-Index (I)

The visualization in Figure 4 demonstrates that the majority of journals (8 out of 10) have achieved efficiency in the *H-Index* aspect. However, 2 journals exhibit inefficiency in the form of a *Negative Slack*, namely DMU 01 (*Information Systems Research*) and DMU 05 (*IEEE Transactions on Information Theory*). The significant negative values in these two journals indicate an *H-Index* surplus that needs to be reduced to reach the projection target, without requiring proportionate shifting.

Number of Citation (I) Analysis

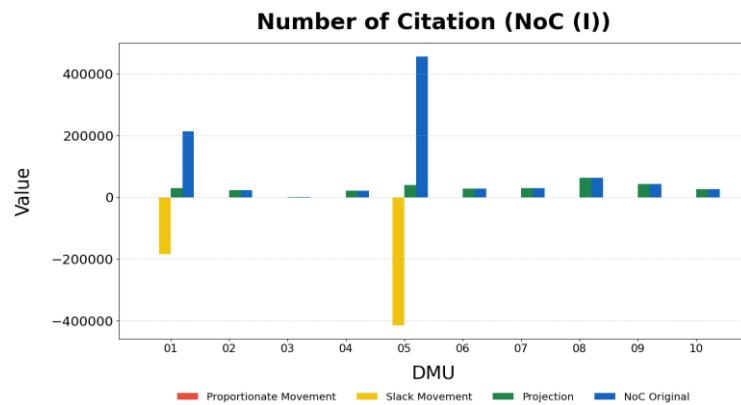


Figure 5. DMU 1-10 Number of Citation (I)

The analysis in Figure 5 shows that 80% of the journals (8 out of 10) have achieved optimal efficiency in the number of citations, indicated by a zero *Slack* value. Conversely, significant inefficiency is found in DMU 01 (*Information Systems Research*) and DMU 05 (*IEEE Transactions on Information Theory*), which recorded large *Negative Slacks*. This indicates a citation surplus that is disproportionate to the generated output, contrasting with the efficiency shown by the majority of the other journals.

X / Twitter (O) Analysis

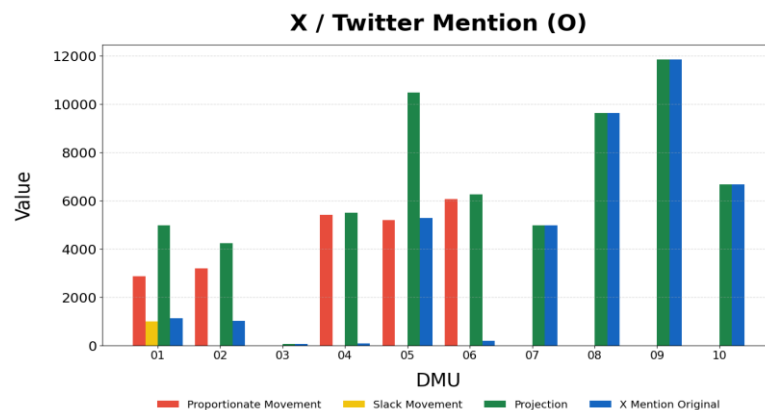


Figure 6. DMU 1-10 X / Twitter (O)

The visualization in Figure 6 illustrates the polarization of reputation performance on *Twitter/X*. Half of the total DMUs (5 journals) are classified as efficient, such as the *Journal of the Medical Library Association* and *Ethics and Information Technology*. In contrast, the other 5 journals require a significant output increase. This is marked by high *Proportionate Movement* values (red bars) in DMU 04 and DMU 06, as well as the appearance of a positive *Slack Movement* in DMU 01. This condition highlights the need for aggressive social media strategy improvements for these inefficient journals.

Facebook (O) Analysis

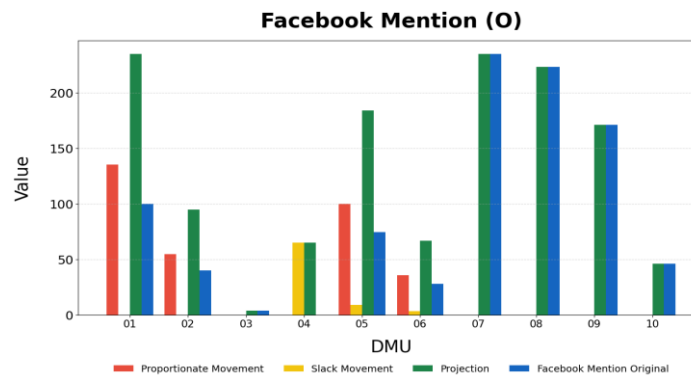


Figure 7. DMU 1-10 Facebook (O)

The visualization in Figure 7 shows performance polarization in the *Facebook Mentions* variable. Five out of ten journals (including DMU 07 and DMU 10) are efficient without needing improvements. Conversely, the other five journals require significant enhancement through *Proportionate Movement* (especially DMU 01 and 02) as well as *Slack Movement*. An extreme case is observed in DMU 04, which has an original data value of 0, thus relying entirely on a *Slack* of 65.07 to reach the projection target. This confirms the necessity of massive strategies for inefficient journals to build visibility on *Facebook*.

Rationalization of APC (I)

Based on the obtained DEA scores, a crucial conclusion can be drawn regarding the rationalization of Article Processing Charges (APC). The analysis indicates that a high APC value does not necessarily hinder the reputation performance of LIS journals on social media. This is confirmed through Figure 3, where 6 out of 10 journals are classified as efficient. This condition implies that the costs set by the publishers for these six journals are cost-effective relative to the reputation or visibility impact they generate on social media. Nevertheless, the other 4 journals (DMU 1, DMU 2, DMU 4, and DMU 6) still show inefficiency, indicating an imbalance between the price determined by the publisher and the actual reputation output received. This can limit the ability of authors to publish their work, potentially causing economic disparities in academic publishing (Jain et al., 2021). Reducing APC costs can encourage more submissions from researchers with limited funding, potentially enhancing the diversity and inclusivity of published research (Acharjee & Acharjee, 2024).

Rationalization of H-Index (I)

Based on the DEA score calculation results, it was identified that 8 out of 10 journals (80%) have successfully utilized their *H-Index* capital well to build their reputation on social media. This indicates that the majority of journals in the sample operate at an optimal efficiency level. However, the remaining 2 journals have not utilized their *H-Index* potential optimally, characterized by a *Negative Slack Movement*. This condition is found in DMU 01 (*Information Systems Research*) and DMU 05 (*IEEE Transactions on Information Theory*). Both journals possess *H-Index* variable values that are excessively high compared to the generated social media output, which is considered an excessive input (resource waste). In other words, although these two journals have a very high academic citation impact, this scientific potential has not been effectively converted into equivalent performance or visibility on social media. The *H-index* itself can be manipulated through self-citation and collaborative citations, where researchers cite each other to increase their *H-Index* values (Poirrier et al., 2021). Meanwhile, the primary benefit of the *H-index* is to measure research performance

more consistently and accurately by combining productivity and quality, showing a statistically significant increase in the *H-Index* as academic careers progress (Lee et al., 2009). Therefore, to achieve an efficient *H-Index* value, it is necessary to reduce excessive publications and self-citations.

Rationalization of Number of Citation (I)

After obtaining the DEA score calculation results, the *Number of Citations* (NoC) variable demonstrates a high efficiency level, reaching 80%. The analysis shows that out of the 10 LIS journals investigated, 8 journals have a *Slack Movement* value of 0, indicating that their citation count is already proportional to their social media performance. Meanwhile, the other 2 journals (DMU 01 and DMU 05) still show a *Negative Slack Movement*. This implies that the actual number of citations in these two journals is considered excessive when compared to the recommended *Projection Value*. This means that despite having a massive academic impact (high citation count), these resources have not been efficiently utilized to boost their social media reputation to its true potential. The DEA score for the number of citations is widely used to measure academic impact and the quality of research results (Fang, 2015). The number of citations is used to evaluate the impact of individual researchers, research groups, and institutions. Metrics such as the *h-index*, which combines productivity and citation impact, are often used to measure the significance of a researcher's work (Bielinska-Kwapisz, 2012). To obtain an efficient value, a balance between the number of publications and the number of citations is required; thus, the quality of the journal's research can be assured (Aksnes et al., 2023).

Rationalization of X / Twitter (O)

Through the DEA score analysis, it was found that 5 out of 10 journals (50%) still have an actual engagement level that is below their potential target (DMU 3, DMU 7, DMU 8, DMU 9, and DMU 10), thus they are considered inefficient in utilizing the available resources. Meanwhile, the other 5 journals are deemed to have a high and efficient engagement level (reaching a score of 1.00). Although the efficiency level is balanced (50:50), the volume of interaction data on this platform far exceeds other platforms (such as Facebook). This proves that *X (Twitter)* is the dominant social media platform used by researchers and academics to disseminate scientific articles. The high projection numbers and activity on this platform solidify the role of *X* as the primary tool in building the digital reputation of LIS journals, compared to other social media channels. For instance, using *Twitter* to interact with audiences and share research articles, by implementing various strategies, can maximize reach and impact (Mansutti & Caruzzo, 2022). Several studies have shown a positive correlation between *Twitter* activity and academic citations. For example, one study found that *Twitter* activity related to research papers significantly increased the number of citations received by those studies (Chan et al., 2023). Another study showed that articles posted on *Twitter* by the authors, especially the first author, tend to receive more citations (Buscho et al., 2025). The primary readership for LIS researchers on *Twitter* consists of professionals and individuals from the higher education sector (Álvarez-Bornstein & Montesi, 2019). LIS journals on *Twitter* tend to share general websites and news portals rather than research articles or participating in retweeting academic content (Raamkumar et al., 2018). Responding to this, it is recommended that LIS journal managers develop strategies for utilizing *X/Twitter* to build journal reputation and continuously conduct evaluation oversight.

Rationalization of Facebook (O)

Facebook is frequently used by researchers for communication and collaboration. The platform provides a means to share information, maintain professional relationships, and interact with peers (Keng & Cheng, 2023). Based on the DEA score assessment, the utilization of *Facebook* as a dissemination medium shows an evenly divided optimization level. Data shows that 5 out of 10 journals (50%) have successfully optimized *Facebook* use efficiently (reaching the target output according to their capacity). However, the other 5 journals have clearly not reached (DMU 3, DMU 7, DMU 8, DMU 9, and DMU 10) this efficiency stage, indicated by the need to improve output values (*Facebook Mentions*). This condition indicates that although *Facebook* is used optimally by some journals, the platform has not been utilized evenly or has not become a strategic priority for the other half of LIS journals in building their digital visibility. One effort to build the reputation of LIS journals on *Facebook* is recruiting participants and collecting data through the platform, which can be more cost-efficient compared to traditional methods (Pedersen & Kurz, 2016). Effective strategies for recruiting participants include creating dedicated *Facebook* pages and groups, offering incentives, and maintaining high engagement levels (Kosinski et al., 2015).

4. CONCLUSION

Based on the Data Envelopment Analysis (DEA), the social media performance evaluation of Library and Information Science (LIS) journals with the highest SJR values shows varying levels of efficiency. The research results identify that 5 DMUs have achieved a perfect efficiency score (1.00), namely DMU 03, 07, 08, 09, and 10. Conversely, the other 5 journals still show performance below the efficient level (inefficient). Thus, it can be concluded that the efficiency rate of digital reputation management in the top LIS journal sample is currently at a 50% ratio. These findings imply the need for strategic intervention from journal management. Publishers are highly advised to form a dedicated editorial team or appoint a social media editor focused on digital dissemination strategies. This step aims to improve the performance and reputation of inefficient journals, ensuring more optimal utilization of social media platforms (particularly *X/Twitter* and *Facebook*) to enhance scientific impact and global visibility.

AUTHORS' CONTRIBUTIONS

Siti Rahmadhani Andevi Putri: Conceptualization, Methodology, Data curation, Data analysis, Writing original manuscript. **Cecep Ibrahim:** Conceptualization, Methodology, Supervision, Data validation, Reviewed manuscript. **Indah Kurnianingsih:** Data curation, Resources. **Danang Dwijo Kangko:** Data validation, Data visualization, Reviewed manuscript.

CONFLICT OF INTERESTS

We state that there are no known conflicts of interest linked with this publication, and that there has been no significant financial assistance for this work that could have influenced its outcome.

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