Opportunities and Challenges of Embedding AI in SINTA: A Systematic Literature Review

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Article Info	Abstract
	The incorporation of Artificial Intelligence (AI) into Indonesia's Science and Technology Index (SINTA) offers both significant opportunities and challenges for advancing research management, evaluation, and development. This paper examines the advantages of embedding AI into SINTA, such as the ability to automate the identification of predatory journals, provide personalized research recommendations, and enhance the accuracy of institutional rankings. Furthermore, AI can help analyze citation trends, streamline the peer review process, and detect plagiarism or other forms of academic misconduct. However, this integration also brings several obstacles, including the need to ensure high-quality data, uphold transparency and fairness in AI-driven outcomes, protect data privacy, and address the substantial technological investments required. While AI holds the potential to greatly strengthen SINTA as a platform for overseeing and supporting research activities in Indonesia, overcoming these challenges is critical for its effective implementation. The study concludes that, with proper oversight and investment, integrating AI into SINTA could significantly boost the country's research ecosystem, fostering greater innovation and scientific productivity.

1. INTRODUCTION

In recent years, the rapid development of Artificial Intelligence (AI) has created new opportunities to improve the management and evaluation of research across various fields. AI has emerged as a transformative technology across multiple domains, revolutionizing processes, decision-making, and service delivery. In the context of academic and research ecosystems, AI has demonstrated its potential to enhance efficiency, accuracy, and accessibility. One of the key platforms in Indonesia's research landscape is the Science and Technology Index (SINTA), which tracks and evaluates scientific publications, institutions, and researchers. As the volume of research grows, integrating AI into platforms like SINTA could greatly simplify tasks such as assessing research quality, identifying predatory journals, and offering tailored recommendations to researchers. However, despite these clear advantages, challenges remain—particularly around data quality, transparency, and the ethical considerations involved in AI-driven decisions.

Previous research has examined the application of AI in managing research systems, particularly in automating peer review, identifying plagiarism, and enhancing the analysis of research metrics (Carobene *et al.*, 2024). Systems like Scopus and Web of Science have incorporated AI to a certain degree, enabling them to recognize publication trends and provide automated evaluations for academic assessment. However, the use of AI in detecting predatory journals or delivering personalized research recommendations is still in development. While tools like Beall's List and Cabell's Blacklist help identify predatory publishers, there remains a need for integrating such AI-driven insights into national platforms, such as SINTA. SINTA is Indonesia's premier research indexing platform, designed to evaluate, rank, and monitor academic outputs. It plays a critical role in the nation's research ecosystem, supporting academic assessments, funding allocations, and policymaking. Given its centrality, integrating AI into SINTA has the potential to elevate its capabilities, aligning it with global standards. The integration of AI into SINTA could revolutionize its operations, enabling features such as automated citation analysis, predictive analytics for research trends, and enhanced peer-review processes. Additionally, AI could facilitate the identification of interdisciplinary research opportunities and improve access to underrepresented research areas, thereby broadening SINTA's impact.

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a certain degree, enabling them to recognize publication trends and provide automated evaluations for academic assessment. However, the use of AI in detecting predatory journals or delivering personalized research recommendations is still in development. While tools like Beall's List and Cabell's Blacklist help identify predatory publishers, there remains a need for integrating such AI-driven insights into national platforms, such as SINTA.

What makes this study particularly significant is its proposal to integrate AI into SINTA, a platform specifically tailored to Indonesia's academic environment. Unlike larger, global systems, SINTA hasn't yet adopted the advanced AI capabilities that could significantly boost the efficiency of research evaluation and safeguard academic integrity. This study explores the potential of embedding AI-driven features like the automatic detection of predatory journals, personalized insights for researchers, and enhanced citation analysis—areas that haven't been fully explored in prior research on SINTA (Fitria, 2023).

The primary research problem examined in this study is how AI can be integrated into SINTA to improve its ability to evaluate scientific outputs while addressing challenges such as predatory publications and maintaining research integrity. The study hypothesizes that embedding AI into SINTA will enhance its capability to manage research data, identify unethical publishing practices, and offer a more personalized experience for researchers, thereby addressing gaps that have been identified in other research systems. The main objective of this article is to examine the potential benefits and challenges of integrating AI into SINTA. It seeks to propose AI-based solutions to address limitations within SINTA's current structure and offer recommendations for its future development, ensuring that it continues to be a reliable platform for managing research outputs in Indonesia.

The paper is organized as follows. In the next section, the author presents the method of this research. The next chapter presents the findings obtained in the results and discussion sections. Lasty, the author concludes by summarizing the findings and proposing implementation suggestions.

2. METHODOLOGY

This study employs a systematic literature review (SLR) to identify, analyze, and synthesize existing research on the opportunities and challenges of embedding AI into SINTA (Science and Technology Index). The SLR approach is chosen to ensure a structured and replicable method for gathering and analyzing relevant studies. The

process aligns with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

The research questions (RQs) guiding this SLR are: RQ1: What are the documented opportunities of integrating AI into research indexing systems like SINTA? RQ2: What are the key challenges in embedding AI into research platforms in developing countries? These questions provide a framework to focus the literature review on relevant studies, avoiding scope expansion.

To ensure comprehensive coverage, the search strategy included multiple databases: Scopus, Web of Science, IEEE Xplore, and Google Scholar. Keywords and Boolean operators used include: ("Artificial Intelligence" OR "AI") AND ("Research Indexing" OR "Digital Repository") and ("Opportunities" OR "Benefits") AND ("Challenges" OR "Barriers") AND ("SINTA" OR "Indonesia"). The search was further refined using filters for peer-reviewed articles, publication years (2010–2024), and English-language publications.

Inclusion criteria include studies discussing AI applications in research indexing or related systems, articles focusing on developing countries or platforms analogous to SINTA, and articles focusing on developing countries or platforms analogous to SINTA. Exclusion criteria are studies unrelated to AI or research platforms, non-peer-reviewed materials (e.g., opinion pieces, blogs) and papers focusing exclusively on developed countries without transferability to the Indonesian context.

The initial search yielded 1,200 articles. After deduplication, 860 articles remained. Two independent reviewers screened titles and abstracts based on inclusion and exclusion criteria, narrowing the list to 200 articles. Full-text review of these 200 articles further reduced the pool to 60 studies deemed relevant to the research questions. Disagreements during the screening process were resolved through discussion or consultation with a third reviewer.

Key data extracted from the selected studies included: title, authorship, and year of publication; objectives and methodologies; identified opportunities (e.g., enhanced efficiency, data analytics); Documented challenges (e.g., resource constraints, ethical concerns); relevance to SINTA or similar research indexing systems. Data extraction was conducted using a standardized template to ensure consistency and completeness.

To ensure the validity and reliability of the findings, each selected study was assessed using the Mixed Methods Appraisal Tool (MMAT). Criteria included methodological rigor, relevance to the research questions, and clarity of reporting. Studies scoring below 60% on the MMAT scale were

excluded, leaving a final corpus of 45 high-quality articles.

The synthesis process involved thematic analysis to identify recurring themes, patterns, and gaps. Studies were grouped into two categories: opportunities of AI integration (e.g., automating workflows, improving citation metrics) and challenges (e.g., infrastructural limitations, data privacy). These themes informed the discussion and recommendations sections of the paper. Efforts were made to mitigate bias at every stage of the SLR. These included: using diverse databases to avoid over-reliance on specific sources, employing independent reviewers for study selection, Documenting the review process transparently to enhance replicability.

While the SLR approach ensures methodological rigor, it is not without limitations. The reliance on English-language studies may exclude relevant non-English literature. Moreover, the focus on peer-reviewed articles may overlook insights from industry reports or grey literature. Future research should consider triangulating SLR findings with expert interviews and case studies for a more holistic understanding.

The gathered literature was analyzed through qualitative methods. A thematic analysis was conducted to uncover recurring themes, trends, and gaps in the existing research. This approach helped pinpoint areas where AI could improve SINTA's capabilities, along with identifying possible challenges. Following the analysis of the reviewed literature, the data was synthesized to offer a thorough understanding of how AI could be integrated into SINTA. This synthesis highlights the opportunities AI brings, as well as the challenges that need to be overcome for successful implementation.

The data analysis focused on identifying recurring patterns and insights regarding the effectiveness of AI in academic evaluation systems. It also examined how AI has been employed in other research platforms to detect unethical practices such as predatory publishing, and how these methods could be adapted for the SINTA platform. Through this literature review, the study seeks to offer a comprehensive analysis of the potential opportunities and challenges of integrating AI into SINTA, drawing from existing research and case studies.

3. METODE PENELITIAN

Penelitian Research Incorporating AI into SINTA could benefit various aspects of scientific data management, research quality monitoring, and improve the user experience. Potential opportunities as well as challenges of AI integration in SINTA are the following.

3.1 Predatory Journal Detection

AI has the potential to greatly enhance predatory journal detection by analyzing patterns associated with academic publishing (da Silva & Scelles, 2024; Teixeira da Silva & Daly, 2023; Teixeira da Silva *et al.*, 2023). AI algorithms, trained on large datasets of identified predatory journals, can assess various factors such as publication timelines, peer review procedures, and citation trends of journals indexed in SINTA. By detecting unusually fast publication cycles, irregular peer review practices, and abnormal citation behaviors, AI can efficiently flag journals that may not meet ethical or academic standards. This proactive, automated approach reduces the need for manual oversight, ensuring that only credible, high-quality journals remain in SINTA's index. This AI-driven system would help protect researchers from submitting to or referencing substandard or unethical publications. Similar to techniques used by platforms like Scopus, integrating AI into SINTA would reinforce the academic integrity of Indonesia's research ecosystem, fostering greater trust in the research disseminated through the platform.

3.2 Automated Ranking

AI-powered automated ranking has the potential to greatly improve the accuracy and efficiency of evaluating institutions, journals, and researchers on the SINTA platform (Saarela & Kärkkäinen, 2020). Through machine learning algorithms, AI can process and analyze large volumes of data in real time, taking into account a variety of factors that influence academic performance. These may include research productivity, such as the number of publications; citation quality, which indicates the impact and relevance of the research; and broader measures of social impact, assessing how research influences societal developments. Unlike traditional ranking methods, which rely on periodic or static data updates, AI enables continuous, dynamic evaluations. This allows rankings to be updated more frequently, providing a current and precise picture of research performance. Additionally, AI can help eliminate biases or inconsistencies in manual ranking processes, ensuring a more objective and comprehensive evaluation of academic contributions. By automating the ranking process, SINTA could increase efficiency while offering real-time performance feedback to researchers and institutions, promoting a more transparent and competitive academic environment.

3.3 Personalization and Recommendations

AI-driven personalization and recommendation systems offer a transformative approach to improving the user experience for researchers on the SINTA platform. By leveraging data from individual research profiles, publications, and performance metrics, AI can provide customized recommendations that are closely aligned with a researcher's field of study and academic goals (Chubb *et al*., 2022; Venkatesan *et al*., 2023). For instance, AI could suggest the most appropriate journals for article submissions by analyzing a researcher's past work, the nature of their current research, and the impact factors of relevant journals. This not only streamlines the submission process but also increases the likelihood of acceptance in high-quality journals, ensuring that the researcher's work reaches the most suitable audience. In addition to optimizing journal submissions, AI could recommend research projects or funding opportunities that align with the researcher's interests or ongoing work (Maghsudi *et al*., 2021). Drawing from the extensive data within SINTA, AI can also identify potential collaborators whose research areas complement or intersect with the researcher's expertise, fostering partnerships that might otherwise go unnoticed. These personalized recommendations have the potential to save researchers time and effort by simplifying processes that are often time-consuming and challenging to navigate. Moreover, by promoting connections between researchers and institutions, AI integration could drive interdisciplinary collaboration and the sharing of knowledge across different fields. This would not only boost research productivity but also elevate the overall quality of academic output.

3.4 Citation Pattern Analysis

AI-powered citation pattern analysis offers a highly effective tool for improving the evaluation of research impact and preserving academic integrity within the SINTA platform. Through machine learning algorithms, AI can analyze extensive citation datasets to uncover important trends, such as the most frequently cited papers, emerging research topics, and highly influential contributions within particular academic fields (Tang *et al*., 2023). This allows for deeper insights into which studies or researchers are making significant advancements, enabling a more accurate evaluation of research impact. Beyond identifying key works and contributors, AI can also detect suspicious citation patterns that may signal unethical practices, such as citation stacking (where authors excessively cite each other's work) or self-citation manipulation (artificially inflating one's own citation count). Such unethical behaviors can skew the perceived impact of research and compromise the integrity of

academic evaluations. By identifying these patterns, AI helps ensure that citation metrics accurately reflect genuine scholarly influence, safeguarding the credibility of the research assessment process within SINTA.

3.5 Institutional Performance Monitoring

AI integration in SINTA for institutional performance monitoring could offer a comprehensive, real-time view of how institutions are performing across multiple research dimensions. By analyzing data on research productivity, AI can track the volume and quality of publications over time, providing insights into each institution's contributions to the academic landscape (Chen *et al*., 2020). It can also identify trends, revealing which fields are gaining prominence and highlighting emerging research areas that may need additional support. Furthermore, AI can assess international collaborations by analyzing co-authored papers, offering a measure of global engagement. These insights would be invaluable for government agencies and policymakers in making data-driven decisions, such as identifying top-performing institutions for targeted investment or flagging those that may need additional support. By recognizing emerging fields, resources can be allocated more effectively, fostering innovation and aligning national research goals with institutional outputs.

3.6 Plagiarism and Academic Dishonesty Detection

AI-powered plagiarism and academic dishonesty detection, especially using Natural Language Processing (NLP), can greatly enhance the integrity of research outputs indexed in SINTA. NLP algorithms can scan articles submitted to SINTA and compare them with a vast database of published works, identifying similarities or direct overlaps that suggest plagiarism. This goes beyond simple text matching, as NLP can also analyze writing patterns to spot suspicious behaviors, such as abrupt shifts in style or language inconsistencies, which may indicate copying from various sources. Additionally, AI can detect self-plagiarism, where authors reuse parts of their own prior work without proper citation (Kumar *et al*., 2024; Rajpal, 2024). By continuously monitoring articles for these issues, AI acts as a proactive tool, upholding ethical standards and ensuring academic integrity. This system helps prevent dishonest practices early on, reinforcing trust and credibility within the Indonesian research community.

3.7 National Research Trend Analysis

AI-driven national research trend analysis within the SINTA platform could provide critical insights into the evolving academic research

landscape in Indonesia. By analyzing vast amounts of research data, AI can detect shifts in focus, identifying emerging fields that are gaining momentum and areas of study that are losing relevance (Taheri & Aliakbary, 2022). This analysis not only maps current academic interests but also forecasts future trends, allowing government agencies and research institutions to make more informed decisions regarding resource allocation, funding, and support. For instance, if AI highlights a surge in publications on environmental sustainability or artificial intelligence, policymakers could prioritize these fields to ensure Indonesia stays competitive in global research. On the other hand, if certain research areas show signs of decline, targeted interventions could be implemented to revitalize interest or address underlying challenges. By providing a comprehensive, real-time overview of the national research environment, AI-powered trend analysis would help shape strategic, forward-thinking research policies that align with both national goals and global innovation trends.

3.8 Data Quality Management

AI-powered data quality management in SINTA would greatly enhance the accuracy, consistency, and validity of the platform's research data. AI algorithms can automatically detect and fix errors, inconsistencies, or missing information within SINTA's large datasets. By identifying duplicate entries, outdated records, or incomplete data, AI can efficiently clean and standardize the information with minimal manual effort (Abedjan, 2022). This ensures that the data in SINTA remains reliable and up-to-date, which is essential for accurate analysis, rankings, and evaluations. Higher data quality boosts SINTA's credibility as a research database and strengthens data-driven decision-making. Government agencies, academic institutions, and policymakers can depend on trustworthy data to shape research strategies, allocate resources, and craft informed policies. In this way, AI-driven data management helps ensure that SINTA remains a precise, robust, and actionable platform for monitoring and advancing Indonesia's academic and research ecosystem.

3.9 Collaboration Recommendations

AI-powered collaboration recommendations could transform the way researchers in Indonesia and beyond connect through SINTA. By analyzing researcher profiles, publication histories, and areas of expertise, AI could identify ideal collaborators with similar research interests or complementary skills, both locally and internationally (Lathabai *et al.*, 2022). This would boost research productivity by connecting individuals who might not have otherwise met, fostering interdisciplinary and cross-institutional partnerships that can lead to innovative

breakthroughs. AI could also suggest collaborations based on emerging research trends or underexplored topics, driving innovation where it's needed most. Additionally, AI can factor in aspects like previous collaboration success, citation impact, and geographic research clusters to offer highly relevant connections. By automating and streamlining the process of building research networks, AI allows researchers to focus more on meaningful projects, strengthening the research ecosystem through greater collaboration. These AI-driven recommendations would not only enhance individual researcher performance but also increase the potential for groundbreaking discoveries on both national and global levels.

3.10 Data Quality Availability

Data quality is essential for the effective integration of AI into SINTA, as the accuracy of AI-driven analyses and recommendations is directly tied to the quality of the data it processes (Bertossi & Geerts, 2020). AI algorithms need clean, accurate, and well-structured data to generate reliable results. If the data within SINTA is incomplete, outdated, or error-ridden, the AI's outputs—such as research rankings, collaboration recommendations, or trend analyses—will be flawed or misleading. Poor data quality can introduce biases, lead to incorrect conclusions, and damage the credibility of SINTA as a trusted research platform. Therefore, before AI implementation, it is critical to thoroughly clean and reorganize SINTA's existing data, addressing inconsistencies, eliminating duplicates, filling in missing information, and updating outdated records. Ensuring high-quality data will allow SINTA to fully leverage AI's potential to deliver accurate insights, support data-driven decision-making, and improve the platform's overall functionality and reliability. Proper data management will not only enhance AI performance but also safeguard the integrity of research evaluations in Indonesia.

3.11 Transparency and Accuracy

Transparency and accuracy are critical when implementing AI-driven decisions in SINTA, especially in sensitive areas like predatory journal detection, researcher rankings, and institutional evaluations. While AI algorithms analyze large datasets to produce results based on complex patterns, it's important that these outcomes aren't perceived as opaque "black box" decisions that are hard to interpret or challenge (Maier *et al.*, 2020). For SINTA to retain the trust of researchers and institutions, all AI-driven decisions must be clear and explainable, allowing users to understand the reasoning behind outcomes such as journal classifications or rankings. Researchers should know why certain journals are flagged as predatory

or why one researcher is ranked higher than another. This transparency helps ensure AI doesn't unintentionally introduce bias or result in unfair judgments that could harm reputations or academic careers. Additionally, accuracy in AI-generated results is crucial, as errors—such as mistakenly labeling a legitimate journal as predatory or incorrectly ranking an institution—could have significant consequences for a researcher's credibility or institutional funding. Maintaining transparency and accuracy helps mitigate these risks and builds trust in AI's role within SINTA, ensuring a fair and reliable academic environment. Regular audits, well-defined criteria, and opportunities for human oversight will safeguard the integrity of AI-driven processes in the platform.

3.12. Data Security and Privacy

Data security and privacy are crucial factors when integrating AI into SINTA, especially given the sensitive nature of the research data, personal information, and institutional records the platform manages. As AI becomes more integrated into SINTA's functions, it must adhere to strict data protection regulations, such as Indonesia's Personal Data Protection Law or international standards like the GDPR, depending on the extent of data sharing and usage. AI systems must be equipped with strong encryption techniques to safeguard sensitive information from unauthorized access or cyberattacks, ensuring confidentiality and security at all times. Additionally, transparency in how data is processed, stored, and used is essential, allowing researchers and institutions full control over their information. Privacy-preserving methods like anonymization and data minimization should be employed, ensuring only the necessary data is used for analysis and minimizing the risk of exposing personal information (Devineni, 2024). Regular security audits, risk assessments, and compliance checks are also critical to identifying vulnerabilities and ensuring that AI operations meet legal and ethical standards. By prioritizing data security and privacy, SINTA can protect its users while building trust and confidence in its AI-driven research management processes.

3.13 Technological Investment

Integrating AI into SINTA will require significant technological investment to ensure the system operates efficiently and effectively. This includes the need for robust computing resources, as AI systems demand substantial computational power to process large volumes of research data, identify patterns, and provide real-time insights. In addition to computing capacity, secure and scalable data storage is essential, as SINTA manages sensitive research and institutional data that must be stored safely while supporting seamless AI

functionality. Strong cybersecurity measures will also be vital to safeguard against breaches and maintain data integrity. Furthermore, a specialized technical team consisting of data scientists, AI experts, and IT professionals will be necessary to manage the AI system, troubleshoot issues, and ensure smooth operations. This team will also be responsible for updating and refining AI algorithms as new advancements emerge, ensuring that SINTA's AI capabilities evolve alongside developments in AI and research management. Such an investment in technological infrastructure goes beyond simply adopting AI (Rock, 2019); it ensures the system performs reliably, providing accurate and actionable insights that will enhance SINTA's credibility and long-term functionality for the academic community.

4. CONCLUSION

Integrating Artificial Intelligence (AI) into the Science and Technology Index (SINTA) brings both considerable opportunities and challenges. AI has the potential to enhance multiple aspects of research management, such as detecting predatory journals, automating rankings, offering personalized research recommendations, and conducting citation analysis. However, the success of this integration hinges on overcoming key challenges, including ensuring data quality, maintaining transparency and accuracy, and safeguarding data security and privacy. Additionally, significant investment in technological infrastructure and the support of a skilled technical team are crucial. If these hurdles are addressed, AI can greatly boost the efficiency, integrity, and credibility of SINTA, strengthening Indonesia's research ecosystem.

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