

BIBLIOMETRIC ANALYSIS OF THE INTERSECTION OF CURRICULUM AND DIGITALIZATION IN SCHOOL ENVIRONMENTS

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Abstract — This study presents a bibliometric analysis of the intersection between curriculum development and digitalization in Indonesian school environments. The data source for this study is Scopus, with publication years ranging from 2010 to 2023. A total of 215 pieces of literature were analyzed. The bibliometric analysis identifies trends in research output, key authors, top affiliations, and contributing countries. Prominent keywords such as curriculum, technology, digital literacy, and the impact of COVID-19 are highlighted, underscoring their significance in educational research. The keyword "curriculum" emerged as the most frequently occurring term, followed by "technology," "digital literacy," and "COVID-19," reflecting the contemporary focus on integrating digital tools in education. The analysis also reveals key authors, including Burbridge B, Reinsfield E, Thumboo J, and Zainal H, each contributing significantly to the field. Top affiliations, such as The University of Waikato, the National University of Singapore, and Deakin University, demonstrate a strong international collaboration. The most productive countries include the United States, Australia, and the United Kingdom. The findings emphasize the importance of integrating digital tools in education and suggest areas for future research to improve digital education practices in Indonesia. This study provides valuable insights into the evolving landscape of curriculum development and digitalization, offering a comprehensive overview of current trends and identifying gaps for future exploration. By highlighting these trends and connections, this research aims to contribute to the ongoing discourse on enhancing educational practices through digital integration.

Keywords: *Bibliometric, Curriculum, Digitalization, School.*

I. INTRODUCTION

The integration of digital technologies into educational curricula has emerged as a vital area of research and practice, driven by the rapid advancement of digital tools and the evolving needs of modern learners(1). In recent years, the digitalization of education has gained significant momentum, especially in the context of enhancing curriculum design and delivery (2). This intersection of curriculum development and digitalization represents a critical area for investigation, encompassing the adoption of digital literacy, the utilization of educational technologies, and the adaptation of teaching and learning practices to a digital age (3,4).

Indonesia, with its diverse educational landscape and commitment to improving educational outcomes, offers a compelling context for studying these dynamics. The nation's education system has been undergoing significant reforms aimed at integrating digital technologies to enhance teaching and learning processes (5). Despite these efforts,

there remains a need for comprehensive analysis and understanding of how these changes are reflected in academic research and practice.

The COVID-19 pandemic has further accelerated the integration of digital technologies in education, highlighting both opportunities and challenges (6). The sudden shift to online and remote learning exposed the varying levels of digital readiness among schools and students, emphasizing the importance of robust digital literacy and infrastructure. This unprecedented situation has underscored the need for resilient educational systems capable of adapting to such disruptions while maintaining effective curriculum delivery.

This study aims to fill this gap by conducting a bibliometric analysis of research focused on the intersection of curriculum development and digitalization within Indonesian school environments. Using Scopus as the primary data source, we examine literature published between 2010 and 2023 to identify trends, key contributors, and emerging themes in this field. By analyzing research output, authorship, institutional affiliations, and contributing countries, this study provides a holistic view of the current state of research and highlights areas requiring further exploration (7,8).

The findings from this bibliometric analysis will offer valuable insights into the progress and challenges of integrating digital tools in Indonesian education. Furthermore, this study seeks to inform policymakers, educators, and researchers about the critical factors influencing the successful implementation of digital curricula. By highlighting prominent keywords such as curriculum, technology, digital literacy, and COVID-19, this research underscores the contemporary relevance and urgency of addressing these issues in the context of educational development.

The evolution of curriculum development in Indonesia, particularly in relation to technological integration, reflects a broader global trend (9,10). This trend is characterized by a shift towards more interactive, student-centered learning experiences facilitated by digital tools. The pandemic has acted as a catalyst, accelerating these changes and prompting a reevaluation of traditional educational models. As schools increasingly adopt digital platforms for instruction and assessment, understanding the dynamics of

curriculum and digitalization becomes crucial. This study aims to provide a comprehensive analysis of these developments, offering a roadmap for future research and practical implementation in the Indonesian education system.

II. METHODOLOGY

The bibliometric method was chosen for this study because it is the most relevant and effective approach for comprehensively analyzing the development and trends of scholarly publications. This method allows for a detailed examination of various metrics, such as citation counts, publication frequencies, and collaborative networks, providing a holistic view of the research landscape (11,12). By employing bibliometric techniques, we can identify key areas of growth, emerging trends, and influential works within the field, making it an invaluable tool for this type of analysis.

The initial step in preparing this bibliometric article involved meticulously designing the data collection process (13). This began with the careful selection of an appropriate database and the formulation of precise keywords to ensure the retrieval of relevant literature. For our study, we chose the Scopus database due to its extensive coverage and reliability as our primary data source. The next crucial aspect was to develop a comprehensive set of keywords, tailored to capture the specific themes and topics pertinent to our research objectives. The keywords we employed are as follows:

(TITLE (curriculum) AND TITLE-ABS-KEY (digitalization OR digital) AND TITLE-ABS-KEY (school)).

From the data collection process, we initially obtained a total of 520 pieces of literature. To ensure that our research remained focused and adhered to our predefined plan, we utilized the filtering options available in Scopus to refine the search results based on specific criteria (14). These criteria included restricting the language to English, ensuring that the publication type was limited to peer-reviewed journals, and setting the publication date to start from the year 2010 onwards. By applying these filters, we were able to narrow down the literature to 234 relevant articles. These selected pieces of literature were then thoroughly analyzed and incorporated into our discussion.

III. RESULTS AND DISCUSSION

1. Descriptive analysis

Based on the results, we collected a total of 215 pieces of literature, which were distributed across 174 different sources, all of which are peer-reviewed journals. The analysis revealed a substantial number of contributing

authors, totaling 734, among whom 37 were sole authors. This indicates a diverse and collaborative research landscape. Additionally, the annual growth rate of the publications in this field was calculated to be 18.41%, reflecting a consistent and significant increase in research output over the years. For a more detailed visual representation of these findings, please refer to Fig. 1 below.

Moreover, the analysis unveiled significant insights into the publication trend, as depicted in Fig. 2. Generally, there has been a consistent upward trajectory in publications concerning this topic. However, notable fluctuations have been observed, particularly within the last three years. Beginning from 2020 to 2023, there appears to be a discernible pattern of alternating peaks and troughs in the publication data, suggesting potential shifts or disruptions in research focus or output during this period.



Fig. 1 Main information

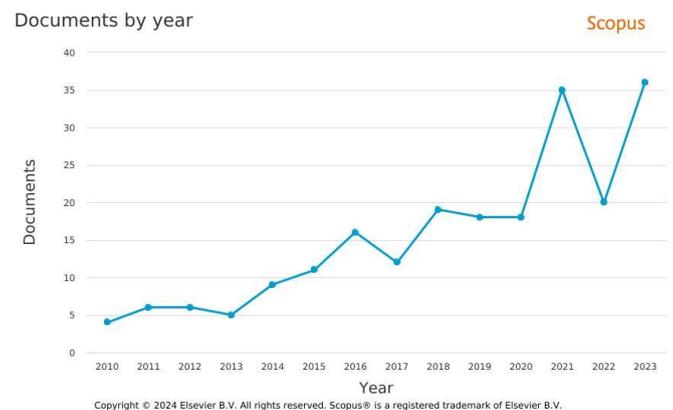


Fig. 2 publications trend

2. Author, Source and Country

Based on the findings, the most prolific authors in this field are Burbridge B, Reinsfield E (15,16), (17,18) J, and Zainal H (19), each contributing a total of three articles on this topic. This highlights their significant role and consistent contributions to the research landscape in this area. Their repeated presence in literature underscores their ongoing commitment and influence within the academic community. For a more detailed overview and additional insights into the publication activities of these

and other authors, please refer to Table 1 below.

Table 1. top 10 author

| Authors | Articles | Articles Fractionalized |
|--------------|----------|-------------------------|
| BURBRIDGE B | 3 | 0,78 |
| REINSFIELD E | 3 | 3,00 |
| THUMBOO J | 3 | 0,75 |
| ZAINAL H | 3 | 0,75 |
| CHIEN Y-H | 2 | 1,50 |
| CLOONAN A | 2 | 0,58 |
| KALRA N | 2 | 0,53 |
| LEARY H | 2 | 0,37 |
| PINELLE D | 2 | 0,53 |
| VOOGT J | 2 | 1,00 |

Additionally, we have summarized the top ten affiliations that have published the most on this topic (20). Leading the list are The University of Waikato, the National University of Singapore, and Deakin University, each with a total of four publications indexed in Scopus. This indicates the prominent role these institutions play in advancing research in this area. For a more detailed view, please refer to Fig. 2 below.

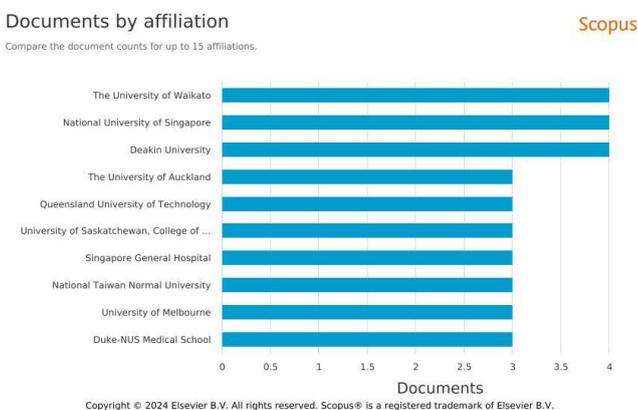


Fig 2. Top 10 most productive affiliation

Next, we present the top ten most productive countries in publishing research on the topic of curriculum integration and digitalization in schools. Leading the list is the United States, which boasts a total of 66 publications. This significant volume of research underscores the country's prominent role and investment in exploring and advancing the integration of digital technologies into educational curricula (21).

In second place is Australia, with 19 publications. Australia's substantial contribution highlights its active engagement and ongoing efforts in this area of research. The emphasis on integrating digital tools and methodologies in education is evident in the country's

academic output.

The United Kingdom follows closely in third place with 17 publications. The UK's research efforts reflect a strong commitment to understanding and implementing digitalization within educational systems, contributing valuable insights and practical applications to the global discourse.

Other notable countries in the top ten include Canada, China, and Germany, each contributing a significant number of publications. This diverse international representation illustrates the global interest and collaborative efforts in enhancing educational practices through digital integration.

These findings indicate a widespread recognition of the importance of digitalization in education across various regions. The concerted efforts by researchers worldwide to address this topic suggest a global commitment to improving educational outcomes through innovative curriculum integration strategies (22,23).

For a more detailed breakdown and visual representation of the publication data by country, please refer to Fig. 3 below. This figure provides a clear overview of the contributions made by each country, offering a comparative perspective on their respective research outputs.

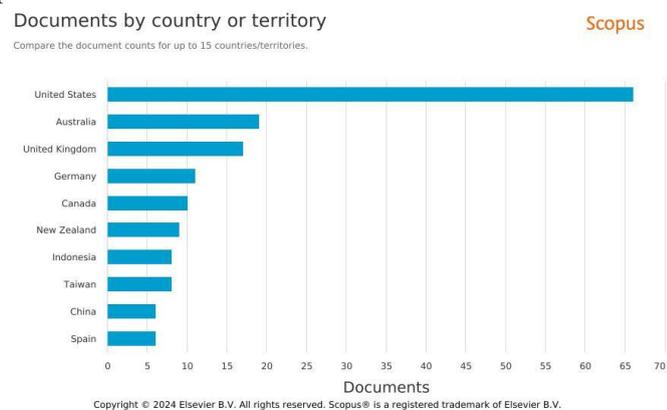


Fig. 3 Top 10 most productive countries

3. Co-Occurrence Word Analysis

The analysis was conducted using VOSviewer software, with a minimum occurrence threshold of 3. This resulted in a total of 40 keywords, which were then visualized. The most frequently appearing keyword is "curriculum," with a total occurrence of 41 and a link strength of 42. Following this, "technology" appeared 12 times with a total link strength of 15. In third place is "digital literacy," which appeared 10 times with a total link strength of 11. Another notable keyword is "COVID-19," which appeared 9 times with a total link strength of 17. For a more detailed view of the top 10 keywords, please refer to Table 2 below.

This visualization provides a clear picture of the

dominant themes in the current research landscape. The high occurrence and link strength of "curriculum" highlight its central role in discussions about educational integration and digitalization. The prominence of "technology" and "digital literacy" underscores the growing emphasis on incorporating technological advancements and digital skills into educational practices.

Interestingly, the keyword "COVID-19" also appears frequently, reflecting the significant impact of the pandemic on educational research. The pandemic has undoubtedly accelerated the adoption of digital tools and e-learning platforms, making it a critical area of study.

The following keywords in the top ten also shed light on important areas of focus within this research domain. The inclusion of terms like "e-learning," "higher education," and "online learning" indicates a strong interest in how digital technologies are reshaping educational environments, particularly in the context of remote and online education.

The visualization and analysis of these keywords provide valuable insights into the current trends and gaps in the research. For instance, while "digital literacy" is prominent, its relatively lower link strength compared to "curriculum" and "technology" suggests that there is room for further exploration of how digital literacy can be more effectively integrated into curriculum design and technological implementations.

Table 2. top 10 keyword

| No | keyword | occurrences | total link strength |
|----|------------------------|-------------|---------------------|
| 1 | curriculum | 41 | 42 |
| 2 | technology | 12 | 15 |
| 3 | digital literacy | 10 | 12 |
| 4 | covid-19 | 9 | 17 |
| 5 | medical education | 9 | 17 |
| 6 | curriculum development | 7 | 8 |
| 7 | education | 7 | 13 |
| 8 | primary education | 7 | 10 |
| 9 | computational thinking | 6 | 3 |
| 10 | curriculum design | 6 | 4 |

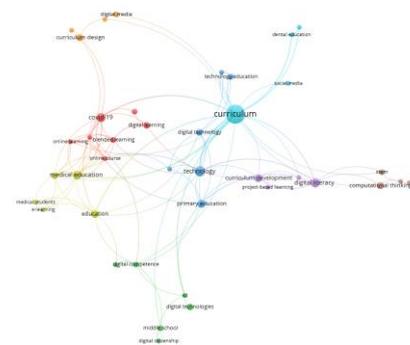
Using VOSviewer software, we successfully visualized the research mapping based on co-word analysis with keyword data. From Fig. 4, we can interpret that the larger the circle, the more frequently the keyword appears, indicating that the topic is extensively researched. Additionally, the more connections or networks a keyword has, the more interconnected the topic is with other topics.

Based on Fig. 4, it is evident that the keyword "curriculum" is central to the visualization, highlighting its prominence in the research landscape. However, an interesting observation is the lack of a direct connection between "digital literacy" and "e-learning." This absence suggests that there is currently insufficient research linking these two crucial aspects of educational technology, presenting a potential gap for future investigation.

The central position of "curriculum" implies that it is a foundational topic in discussions about educational integration and digitalization. The prominent network surrounding it indicates numerous interconnections with various related topics, underscoring the multifaceted nature of curriculum development in the digital age.

The observation regarding the weak linkage between "digital literacy" and "e-learning" is particularly significant. Digital literacy is essential for effectively navigating and utilizing digital tools, while e-learning represents the practical implementation of these tools in educational settings. The lack of strong co-occurrence between these terms suggests that research has not yet fully explored their interplay, despite their logical and practical connections.

This gap highlights an opportunity for further research to bridge these concepts, potentially leading to more integrated and holistic approaches to digital education. Future studies could focus on how digital literacy can enhance e-learning experiences and vice versa, providing valuable insights into optimizing educational practices in the digital era.



IV. CONCLUSION

The conclusion of this study underscores the critical role of curriculum development in the successful integration of digital tools within educational settings. Through a bibliometric analysis, this research has illuminated key trends in scholarly output, identified influential authors and institutions, and mapped global contributions to this field, with a specific focus on Indonesia. Prominent themes such as curriculum, technology, digital literacy, and the impact

of COVID-19 have been highlighted, demonstrating their significance in current educational research. The findings reveal significant opportunities for future research aimed at enhancing digital education practices in Indonesia, thereby contributing to the broader discourse on educational innovation and digital transformation. The centrality of "curriculum" and the disjointed relationship between "digital literacy" and "e-learning" offer a roadmap for scholars seeking to advance the evolving discourse on digital integration in education.

V. REFERENCES

1. Caneva C, Monnier E, Pulfrey C, El-Hamamsy L, Avry S, Delher Zufferey J. Technology integration needs empowered instructional coaches: accompanying in-service teachers in school digitalization. *International Journal of Mentoring and Coaching in Education* [Internet]. 2023;12(2):194 – 215. Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85152001895&doi=10.1108%2fIJMCE-04-2022-0029&partnerID=40&md5=875135cb263b196e46aa5fce7193b12c>
2. Latif N, Shevyakova V. Leadership brings innovation through digitalization: A study on how leaders contribute to digital innovations [Internet]. *diva-portal.org*; 2021. Available from: <https://www.diva-portal.org/smash/record.jsf?pid=diva2:1579771>
3. Stenalt MH. Digital student agency: Approaching agency in digital contexts from a critical perspective. *Frontline Learn Res* [Internet]. 2021;9(3):52–68. Available from: <http://dx.doi.org/10.14786/flr.v9i3.697>
4. Roman-Acosta D, Caira-Tovar N, Rodríguez-Torres E, Pérez Gamboa AJ. Effective leadership and communication strategies in disadvantaged contexts in the digital age; [Estrategias efectivas de liderazgo y comunicación en contextos desfavorecidos en la era digital]. *Salud, Ciencia y Tecnología - Serie de Conferencias* [Internet]. 2023;2. Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85184156351&doi=10.56294%2fsctconf2023532&partnerID=40&md5=7f815033efecc51301209d1c28b864a6>
5. Wulansari I. Merdeka Curriculum Management Based on Character Education in The Millennial Generation. *Journal of Quality Assurance in Islamic Education (JQAIE)* [Internet]. 2022;2(2):74–86. Available from: <http://dx.doi.org/10.47945/jqaie.v2i2.702>
6. Pramono SE, Wijaya A, Melati IS, Sahudin Z, Abdullah H. COVID-Driven Innovation in Higher Education: Analysing the Collaboration of Leadership and Digital Technology during the Pandemic in UiTM Malaysia and UNNES Indonesia. *Asian Journal of University Education* [Internet]. 2021;17(2):1 – 15. Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85111489800&doi=10.24191%2fAJUE.V17I2.13393&partnerID=40&md5=3a1e05320fab185f591ced2aa90073c0>
7. van Dijk F, Gadellaa J, van Toledo C, Spruit M, Brinkkemper S, Brinkhuis M. Uncovering the structures of privacy research using bibliometric network analysis and topic modelling. *Organizational Cybersecurity Journal: Practice, Process and People* [Internet]. 2023 Jan 1;ahead-of-print(ahead-of-print). Available from: <https://doi.org/10.1108/OCJ-11-2021-0034>
8. Wahid R, Shukri S, Ahmad MZ. A bibliometric analysis on trends, directions and major players of international relations studies. *Journal of International Studies*. 2023;19.
9. Ockta Y, Mardesia P. A Correlational Study: Pedagogical and professional competence of physical education teachers in relation to the implementation of the Merdeka curriculum. *Journal of Physical Education and Sport* [Internet]. 2023;23(12):3325–31. Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85181759148&doi=10.7752%2fjpes.2023.12380&partnerID=40&md5=244a005d6c05d5589531ff6c2f07a3b0>
10. Taridala S, Sukotjo E, Rahmaniar S. Implementation of the Merdeka Belajar Program in Improving Teacher Performance and the Quality of Educational Services. *International Journal of Membrane Science and Technology* [Internet]. 2023;10(2):1445–9. Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85165717462&doi=10.15379%2fijmst.v10i2.1495&partnerID=40&md5=6a595eeb76c351b0c83cc221e5242226>
11. Tlili A, Altinay F, Huang R, Altinay Z, Olivier J, Mishra S, et al. Are we there yet? A systematic literature review of Open Educational Resources in Africa: A combined content and bibliometric analysis. *PLoS One* [Internet]. 2022;17(1 January). Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0->

- 85123172222&doi=10.1371%2fjournal.pone.0262615&partnerID=40&md5=8aaa60231ed31980f52fa3fb8cb59d94
12. Karakose T, Papadakis S, Tülübaş T, Polat H. Understanding the Intellectual Structure and Evolution of Distributed Leadership in Schools: A Science Mapping-Based Bibliometric Analysis. Sustainability (Switzerland) [Internet]. 2022;14(24). Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85144867988&doi=10.3390%2fsu142416779&partnerID=40&md5=4de898c304e3c4239151a364b4a3b10f>
13. Li JM, Wu TJ, Wu YJ, Goh M. Systematic literature review of human-machine collaboration in organizations using bibliometric analysis. Management Decision [Internet]. 2023 Jan 1;ahead-of-print(ahead-of-print). Available from: <https://doi.org/10.1108/MD-09-2022-1183>
14. Mahajan PS, Raut RD, Kumar PR, Singh V. Inventory management and TQM practices for better firm performance: a systematic and bibliometric review. The TQM Journal [Internet]. 2023 Jan 1;ahead-of-print(ahead-of-print). Available from: <https://doi.org/10.1108/TQM-04-2022-0113>
15. Reinsfield E. A future-focused approach to the technology education curriculum: the disparity between intent and practice. Int J Technol Des Educ [Internet]. 2020;30(1):149 – 161. Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85061243914&doi=10.1007%2fs10798-019-09497-6&partnerID=40&md5=82736784d405325b6d8ccd3b54e576b>
16. Reinsfield E. A future-focused conception of the New Zealand curriculum: culturally responsive approaches to technology education. Int J Technol Des Educ [Internet]. 2020;30(3):427 – 435. Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85064232304&doi=10.1007%2fs10798-019-09510-y&partnerID=40&md5=3699db6a567c96d2716f8a85058f28f2>
17. Zainal H, Xin X, Thumboo J, Fong KY. Medical school curriculum in the digital age: perspectives of clinical educators and teachers. BMC Med Educ [Internet]. 2022;22(1). Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85131167994&doi=10.1186%2fs12909-022-03454-z&partnerID=40&md5=8583a1cfb25744df9553b10a1fceb101>
18. Xiang L, Yoon S, Low AHL, Leung YY, Fong W, Lau TC, et al. Approaches to improving symptom appraisal: A systematic literature review. BMJ Open [Internet]. 2022;12(8). Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85136414872&doi=10.1136%2fbmjopen-2022-064521&partnerID=40&md5=d8a234cab92d630cb6fd866423384f7>
19. Zainal NH. Tantangan Kebijakan Pembelajaran Jarak Jauh Di Era Pandemi COVID 19. PENCERAHAN [Internet]. 2020; Available from: <http://www.jurnalpencerahan.org/index.php/jp/article/view/31>
20. Palvia S, Aeron P, Gupta P, Mahapatra D, ... Online education: Worldwide status, challenges, trends, and implications. Journal of Global ... [Internet]. 2018; Available from: <https://www.tandfonline.com/doi/abs/10.1080/1097198X.2018.1542262>
21. Kailani R, Susilana R, Rusman R. Digital Literacy Curriculum in Elementary School. Teknodika [Internet]. 2021; Available from: <https://jurnal.uns.ac.id/Teknodika/article/view/51784>
22. Lu J. Data analytics research-informed teaching in a digital technologies curriculum. INFORMS Transactions on Education [Internet]. 2020;20(2):57 – 72. Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85085596780&doi=10.1287%2fITED.2019.0215&partnerID=40&md5=9a9b328923a7e4ab48419c8bfa23f01d>
23. Agarwal S, Sen A. Antiracist Curriculum and Digital Platforms: Evidence from Black Lives Matter. Manage Sci [Internet]. 2022;68(4):2932 – 2948. Available from: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85132917237&doi=10.1287%2fmnsc.2021.4281&partnerID=40&md5=a822decf6acbb3141427a7d407c62926>