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A Systematic Literature Review of Supporting Factors for Big Data Analytics (BDA) in Public Sector Auditing

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Big Data Analytics (BDA); Public Sector Auditing; Systematic Literature Review (SLR); PRISMA; Supporting Factors.

ABSTRACT

The application of Big Data Analytics (BDA) in auditing offers significant benefits, including increased accountability and transparency, as well as reduced operational costs. BDA is also expected to improve the quality and reliability of audit results used for decision-making. The role of BDA in public sector auditing is crucial, as it helps detect anomalies or fraud, enhance oversight, and evaluate implemented policies. Despite its benefits, the application of BDA in public sector auditing still faces various challenges that need to be addressed. This study aims to analyze the factors that support the implementation of BDA in public sector auditing and identify the challenges encountered during its implementation. This research uses a systematic literature review (SLR) approach with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. The study also employs the Content Validity Index (CVI) to validate the relevance of the identified factors and their classification. The results reveal eight factors that support the use of BDA in public sector auditing: perceived organizational benefits; process management; data privacy, security, and governance; data quality; people aspects; auditor aspects; organizational aspects; and systems, tools, and technologies. Public sector auditing needs to consider these factors when implementing BDA to improve audit effectiveness, efficiency, and the quality of oversight. Proper implementation of BDA can strengthen transparency and accountability in public financial management and policy oversight.

INTRODUCTION

Big data refers to a group of large and complex structured and unstructured data that cannot be processed using traditional techniques (Isa & Subramanian, 2024). Governments use Big Data Analytics (BDA) to facilitate business processes. With Big Data, governments can improve audit efficiency and scope. Governments can also collect critical electronic audit data more easily by building a big data audit platform. This platform collects various structured and unstructured data, such as public funds, state-owned assets, and state-owned resources

(Surbakti, Wang, Indulska, & Sadiq, 2020). To derive greater value, big data require further processing and analysis. Analytical methods can then be applied to refined datasets to generate insights relevant to the audit process (Krieger & Drews, 2018).

Data analytics plays a crucial role in the audit process, particularly in reducing errors in audit data processing. By minimizing these errors, audit results become more accurate and of higher quality. High-quality audit results increase stakeholder confidence in using them as a basis for decision-making and policy formulation. In line with this, Álvarez-Foronda, De-Pablos-Heredero, & Rodríguez-Sánchez (2023) stated in previous research that Big Data Analytics (BDA) can better identify and evaluate both structured and unstructured data, resulting in stronger audit evidence. By using supporting tools to analyze data, auditors gain a more comprehensive understanding of the audit environment, expand the scope of substantive testing, improve the accuracy of fraud detection, and enhance overall audit quality (Sanoran & Ruangprapun, 2023). Furthermore, one of the key benefits of implementing BDA in the audit process is increased time efficiency. By adopting BDA, auditors can process large volumes of data more quickly and accurately. However, despite its significant benefits, the implementation of BDA in auditing practice remains limited (Hezam, Anthonysamy, & Suppiah, 2023).

The use of BDA is a new innovation that offers significant benefits for auditing, particularly in the public sector. In their research, Sun, Niu, & Lu (2021) stated that utilizing BDA in public sector audit processes improves audit accuracy, making audit findings more reliable and trustworthy for decision-making. Given the significant benefits of BDA in public sector auditing, it is crucial to identify the key factors supporting its implementation in government audits to avoid suboptimal realization of its benefits. Without proper implementation, auditors may struggle to achieve time efficiency, and risk analysis as well as other substantive procedures may still rely heavily on manual data processing and auditor judgment. This situation ultimately affects the reliability of audit reports used for decision-making.

Previous research on BDA in auditing has focused more on implementation strategies and their impact on audit outcomes. For example, Ismail and Hamid (2024) examined the practice of using BDA in financial audit analysis, which remains limited compared to its potential benefits. Meanwhile, studies on determinants of BDA success have primarily focused on model development and hypothesis testing. One such study examined the impact of BDA adoption on audit quality using the Technology Acceptance Model (TAM) (Al-Ateeq, Sawan, Al-Hajaya, Altarawneh, & Al-Makhadmeh, 2022).

Other research focusing on factors contributing to successful BDA implementation in auditing was conducted by Dagilienė & Klovienė (2019). In this study, factors were analyzed through interviews with 21 practitioners at a Lithuanian public accounting firm. A similar study was conducted by Jacky & Sulaiman (2022) through a survey of external auditors in Malaysia. However, the findings of both studies are limited due to their single-country context, which restricts generalizability to other settings. To address this limitation, this study, A Systematic Literature Review of Supporting Factors for Big Data Analytics (BDA) in Public Sector Auditing, employs a systematic literature review (SLR) approach to provide a broader, more comprehensive, and more generalizable synthesis. The review synthesizes peer-reviewed journal and conference publications from 2021–2025 to reflect recent developments and ensure forward-looking relevance.

The urgency of this research is driven by the increasing complexity and volume of public sector data, along with growing demands for transparency, accountability, and efficiency in government financial management. As governments worldwide undergo digital transformation, integrating BDA into public auditing practices becomes essential to keep pace with these changes and strengthen data-driven decision-making. This study contributes by identifying factors that support BDA implementation in public sector auditing, which can later be used as a basis for evaluation and strategy development to improve BDA utilization in audit practice. Additionally, this study offers a novel contribution by highlighting factors in BDA implementation tailored to the audit sector, particularly the auditor aspect, which remains underexplored in previous research.

This research contributes by identifying factors that support the implementation of BDA in public sector auditing, which can be used as a basis for developing strategies to improve its utilization in audit practice. In addition, this study provides a novel contribution by emphasizing implementation factors tailored to the audit sector, with a specific focus on auditor-related aspects.

This paper is organized into several sections. The first section presents the abstract, followed by the introduction. The next section discusses the literature review and research methodology. The results and discussion are then presented, and the final section provides conclusions and limitations of the study.

METHOD

The literature review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method to ensure methodological rigor (Page et al., 2021). The process consisted of four stages: identification, screening, eligibility, and inclusion, as shown in Figure 1. The identification stage involved determining the scope of the review and selecting relevant keywords. The screening stage involved filtering studies based on predefined inclusion and exclusion criteria. The eligibility stage involved a more detailed assessment of full-text articles to determine their relevance to the research objectives. The final stage, inclusion, consisted of selecting studies that met all criteria for synthesis in this review.

Systematic Literature Review (SLR)

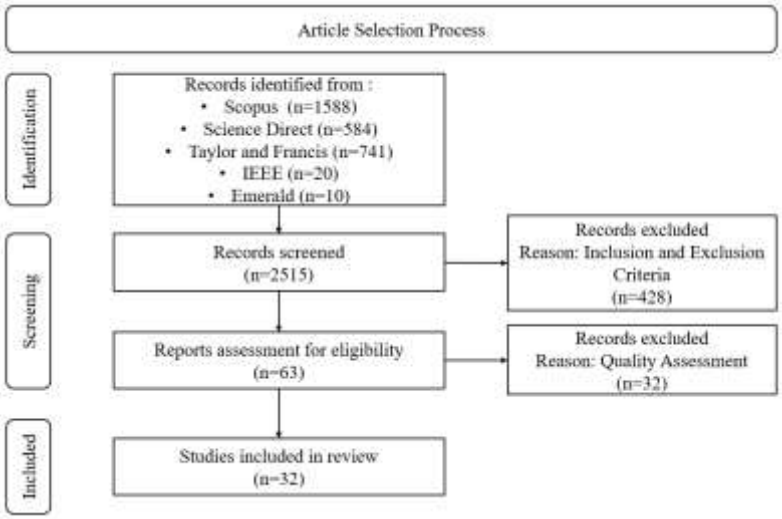

Figure 1. PRISMA method

Identification

In determining the literature for further analysis, the author planned the SLR with three stages. Those consist of databases/sources of literature and keywords.The first step was to determine the sources used for the literature search. Three sources were used, namely Scopus (scopus.com), Science Direct (sciencedirect.com), Taylor and Francis (tandfonline.com), IEEE (ieee.org), and Emerald Insight (emerald.com)The next step was to define the keywords. Proper, well-formulated keywords will produce accurate findings. The study used keywords such as big data analytics, public sector and factors. To identify literature relevant to identifying factors related to big data implementation in public sector auditing, a systematic keyword string was constructed by considering the study's main themes. Based on these groups, the search string used was:

("Big data" OR "Data analytics" OR "Data Science") AND ("public sector" OR "government") AND audit AND ("support" OR "factors" OR "enablers" OR "drivers")

From the search based on the keywords above, the results obtained were 1588 papers from Scopus, 584 papers from Science Direct, 741 papers from Taylor and Francis, 20 paper for IEEE, and 10 paper from Emerald Insight. The total of articles obtained from identification were 2515 articles.

Screening

The next step was to determine the Inclusion Criteria and Exclusion Criteria as follows table 1.

Table 1. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
2021-2026	Not Relevant
English language	Literature duplication
Open Access	
Research article or Conference paper	

At the screening stage, the first action was to remove duplicates from the databases; 428 articles were deduplicated. The next step, the researcher applied inclusion and exclusion criteria based on table 1. The researcher then applied several filters to the titles and abstracts

of the retrieved articles. The result yielded 63 prior studies whose keywords, titles, and abstracts were like those targeted by the researcher.

In the eligibility stage, a rigorous screening of the substantive content of the texts was conducted. This involved reading the entire text, from the abstract to the conclusion, and was applied to all 63 articles that passed the previous stage. The purpose was to identify the factors supporting the implementation of Big Data Analytics (BDA) in public sector audits. The screening was based on predetermined criteria, which included: clear research objectives, comprehensive research methods, public sector focus, explanation of factors supporting BDA in audits, and strategies for implementing BDA. Each question was scored with Yes (1) or No (0), and articles that did not meet the threshold of 4 were disqualified. As a result, 32 articles passed, serving as the primary references for this study.

The next step involved classification, where these factors were grouped based on their similarities. The classification was grounded on a framework developed in previous research (Surbakti et al., 2020), which categorized factors influencing BDA use in general. The novelty of this study lies in its focus on BDA in public sector audits, particularly emphasizing the auditor aspect as the main stakeholder.

Validation was carried out using the Content Validation Index (CVI) method to assess the relevance and grouping of these factors. Six resource persons, including BDA management and auditors with at least 5 years of experience, were involved in the validation process, ensuring a minimum I-CVI of 0.83. The resource persons assessed the relevance of each factor using a 1-4 rating scale, where scores of 3 or 4 were considered appropriate. The results were calculated using both I-CVI and S-CVI, based on averages rather than universal agreement, as recommended by Wang & Sahid (2024). The validation process also included input from resource persons on the factors and their classification.

RESULT AND DISCUSSION

Systematic Literature Review Result

The systematic literature review conducted for the period 2021-2025 identified a total of 32 relevant articles. In this study, the articles used as primary references were all from journals or conferences. Of the 32 articles, 25 (78%) were from journals, while the remaining 7 (22%) were presented at conferences.

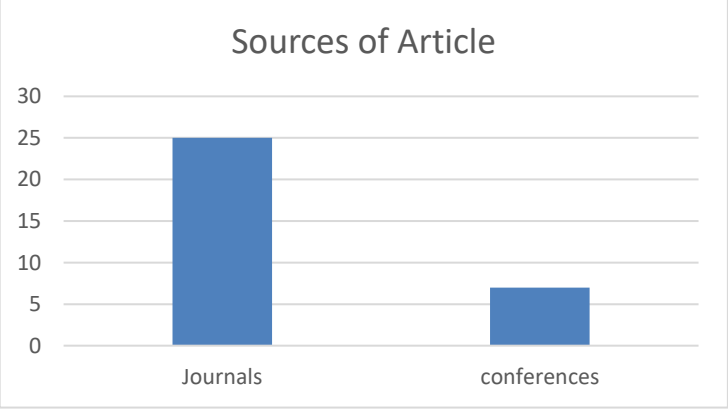

Figure 2. Sources of Articles

Of the 32 eligible articles, the largest number of articles occurred in 2023 and 2024, with 12. This indicates that the topic of BDA in this public audit continues to receive significant attention.

Table 2. Table Number of Article by Year

Year of Publication	Journals	Conferences	Number
2021	2	1	3
2022	3	1	4
2023	5	1	6
2024	7	3	10
2025	7	1	8
2026	1	0	1
Total	25	7	32

After identifying 32 eligible articles, it can be concluded that research related to the supporting factors for BDA implementation in public sector audits has been conducted in 12 countries. The case study countries are Brunei Darussalam, Ukraine, Spain, Italy, and Portugal (in the same study), Saudi Arabia, Vietnam, Norway, the US, Malaysia, China, Turkey, and Indonesia. Meanwhile, there are articles that do not specifically mention a country, only listing the region, namely Africa and the global. The most frequently studied country is Indonesia, followed by Turkey, China, Malaysia, and the USA, which ranks jointly in second place. This indicates that the implementation of BDA in public auditing is a matter of concern not only in developing countries but also in developed nations.

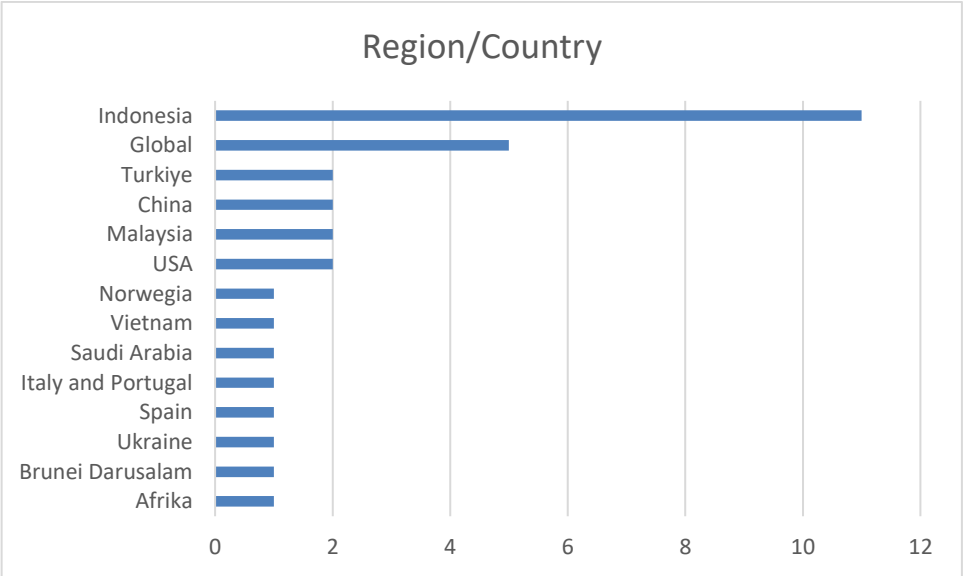

Figure 3. Region/ Country of Articles

Supporting Factors for BDA Implementation (RQ1)

This section is focused on answering the first research question (RQ1), which is identifies the factors that support the implementation of Big Data Analytics (BDA) for audit in public sector. There are three steps involved in determining the supporting factors for BDA implementation in sector audits. First, the supporting factors are analyzed from the SLR

journal. Second, these supporting factors are classified. Finally, the suitability of the identified supporting factors and their classification are validated.

The following table presents the results of steps 1 and 2, namely the supporting factors for BDA implementation in sector audits and their classification. The factors of the implementation of BDA in audit sector are presented with a classification based on the findings of codification in each scientific article. The factors are classified according to the rationale for the implementation and similarity of activities. The supporting factors are perceived organizational benefits, process management, data privacy and security, data governance, people aspect, organizational aspect, and system, tools and technologies as presented in table 3.

Table 3. Table Supporting Factors for BDA Implementation in Public Sector Audit

Aspect	Supporting Factors	Scientific Article Reference	Number of Scientific Articles
Perceived Organizational Benefits	Accuracy & Efficiency	(Isa & Subramanian, 2024), (Agostino, Lourenço, Jorge, Bracci, & Cruz, 2025), (Rivalldo & Widuri, 2023), (Saud, Sofyani, Utami, Haq, & Fathmaningrum, 2025), (Zhang, Zhang, & Wang, 2024), (Junaidi, Hendrian, & Syahputra, 2024), (Putra, Sulistiyo, Diah, Rahayu, & Hidayat, 2022), (Taşdöken, 2024), (Karagül & SelİmoğIu, 2025), (Vu et al., 2025), (Sofyani, Amalia, et al., 2025), (Sofyani, Amalia, et al., 2025)	12
	Transparency & Trust	(Kim et al., 2024), (Taşdöken, 2024), (Karagül & SelİmoğIu, 2025), (Vu et al., 2025), (Yanuarisa et al., 2025), (Agrawal et al., 2025), (Amalia & Sofyani, 2025), (Volodina & Grossi, 2025), (Sofyani, Amalia, et al., 2025), (Sofyani, Amalia, et al., 2025)	10
	Decision-making Support	(Alotaibi & Alnesafi, 2023), (Kim et al., 2024), (Taşdöken, 2024), (Karagül & SelİmoğIu, 2025), (Pratama & Komariyah, 2023), (Amalia & Sofyani, 2025), (Sofyani, Darmawan, et al., 2025), (Sofyani, Amalia, et al.,	9

		2025), (Sofyani, Amalia, et al., 2025)	
	Audit Quality & Scope	(Agostino et al., 2025), (Otia & Bracci, 2022), (Putra et al., 2022), (Suppiah & Arumugam, 2023), (Karagül & Selİmoğlu, 2025), (Vu et al., 2025), (Yanuarisa et al., 2025), (Amalia & Sofyani, 2025), (Sofyani, Darmawan, et al., 2025), (Sofyani, Amalia, et al., 2025), (Sofyani, Amalia, et al., 2025)	11
	Operational Effectiveness	(Agostino et al., 2025), (Rivalldo & Widuri, 2023), (Saud et al., 2025), (Zhang et al., 2024)	4
	Ease of Use & Practicality	(Agostino et al., 2025), (Taşdöken, 2024), (Vu et al., 2025), (Pratama & Komariyah, 2023), (Amalia & Sofyani, 2025), (Sofyani, Darmawan, et al., 2025), (Yahya et al., 2024), (Sofyani, Amalia, et al., 2025)	8
Process Management	Change Management	(Ceki & Moloi, 2025b), (Eger & Smith, 2021),(Yanuarisa et al., 2025), (Volodina & Grossi, 2025), (Zam et al., 2021)	5
	Strategic Planning and Business Model Development	(Alotaibi & Alnesafi, 2023), (Otia & Bracci, 2022), (Ceki & Moloi, 2025a), (Karagül & Selİmoğlu, 2025), (Yahya et al., 2024)	5
	Public Government	(Alotaibi & Alnesafi, 2023), (Karagül & Selİmoğlu, 2025), (Volodina & Grossi, 2025), (Zam et al., 2021)	4
Data Privacy and Security	Regulation	(Ismail, Zakimi, Hamid, Hosni, & 1(, n.d.), (Agostino et al., 2025), (Taşdöken, 2024), (Karagül & Selİmoğlu, 2025), (Yanuarisa et al., 2025), (Zam et al., 2021)	6
	Security	(Isa & Subramanian, 2024), (Sun et al., 2021), (Agostino et al., 2025), (Rivalldo & Widuri, 2023), (Ceki & Moloi, 2025b), (Ceki & Moloi, 2025a), (Taşdöken, 2024), (Karagül & Selİmoğlu, 2025),	10

		(Volodina & Grossi, 2025), (Zam et al., 2021)	
Data Governance	Data Quality	(Isa & Subramanian, 2024), (Sun et al., 2021), (Ismail et al., n.d.), (Eger & Smith, 2021), (Taşdöken, 2024),(Yanuarisa et al., 2025), (Zam et al., 2021)	7
	Data Management	(Isa & Subramanian, 2024), (Sun et al., 2021), (Ismail et al., n.d.), (Eger & Smith, 2021), (Taşdöken, 2024), (Yanuarisa et al., 2025), (Zam et al., 2021)	7
	Continuous Monitoring for Effective Control	(Ceki & Moloi, 2025b), (Shevchenko, Marukhlenko, Trach, Shvedenko, & Dubovych, n.d.), (Taşdöken, 2024), (Karagül & SelİmoğIu, 2025), (Yanuarisa et al., 2025)	5
People Aspect	Social Influence	(Ismail et al., n.d.), (Saud et al., 2025), (Pratama & Komariyah, 2023)	3
	Collaboration and Stakeholder Engagement	(Shevchenko et al., n.d.), (Eger & Smith, 2021), (Ramadhan, Janssen, & Voort, 2023), (Vu et al., 2025), (Yanuarisa et al., 2025)	5
	Auditor Competence & Skill	(Isa & Subramanian, 2024), (Sun et al., 2021), (Purnamasari & Hartanto, 2022), (Ismail et al., n.d.), (Agostino et al., 2025), (Ceki & Moloi, 2025a), (Pratama & Komariyah, 2023), (Amalia & Sofyani, 2025), (Sofyani, Darmawan, et al., 2025), (Yahya et al., 2024), (Volodina & Grossi, 2025), (Zam et al., 2021), (Sofyani, Amalia, et al., 2025)	13
	Auditor Perception and Needs	(Álvarez-Foronda et al., 2023), (Alotaibi & Alnesafi, 2023), (Rivalldo & Widuri, 2023), (Pratama & Komariyah, 2023), (Sofyani, Amalia, et al., 2025)	5
	Auditor Certification	(Sofyani, Amalia, et al., 2025)	1
	Capacity Building and Training	(Álvarez-Foronda et al., 2023), (Otia & Bracci, 2022), (Ceki & Moloi, 2025b), (Taşdöken, 2024), (Vu et al.,	12

		2025), (Yanuarisa et al., 2025), (Pratama & Komariyah, 2023), (Amalia & Sofyani, 2025), (Sofyani, Darmawan, et al., 2025), (Yahya et al., 2024), (Zam et al., 2021), (Sofyani, Amalia, et al., 2025)	
Organizational Aspect	Resources	(Sun et al., 2021), (Ismail et al., n.d.), (Ceki & Moloi, 2025b), (Ceki & Moloi, 2025a), (Vu et al., 2025), (Pratama & Komariyah, 2023), (Sofyani, Darmawan, et al., 2025), (Yahya et al., 2024), (Zam et al., 2021), (Sofyani, Amalia, et al., 2025), (Sofyani, Amalia, et al., 2025)	11
	Digital Culture	(Ceki & Moloi, 2025b), (Ceki & Moloi, 2025a), (Pratama & Komariyah, 2023), (Sofyani, Darmawan, et al., 2025), (Yahya et al., 2024), (Sofyani, Amalia, et al., 2025)	6
	Management Commitment	(Álvarez-Foronda et al., 2023), (Ismail et al., n.d.), (Ceki & Moloi, 2025b), (Ceki & Moloi, 2025a), (Amalia & Sofyani, 2025)	5
	Digital Leadership	(Álvarez-Foronda et al., 2023), (Ceki & Moloi, 2025a), (Amalia & Sofyani, 2025), (Volodina & Grossi, 2025)	4
System, Tools, and Technologies	Integration Technology	(Ismail et al., n.d.), (Otia & Bracci, 2022) (Ceki & Moloi, 2025b), (Zhang et al., 2024), (Eger & Smith, 2021), (Karagül & Selİmoğlu, 2025), (Vu et al., 2025), (Sofyani, Amalia, et al., 2025), (Sofyani, Amalia, et al., 2025)	9
	Infrastructure Capability	(Sun et al., 2021), (Ismail et al., n.d.), (Ceki & Moloi, 2025b), (Suppiah & Arumugam, 2023), (Taşdöken, 2024), (Sofyani, Amalia, et al., 2025)	6
	Technological Features	(Purnamasari & Hartanto, 2022), (Saud et al., 2025), (Ramadhan et al., 2023), (Sofyani, Amalia, et al.,	5

	2025), (Sofyani, Amalia, et al., 2025)	
External Support	(Ceki & Moloi, 2025a)	1

After grouping as described above, the next step is to validate the suitability using the CVI method. First, an I-CVI calculation is performed by adding up the relevance values of each criterion provided by the informants. Values 1 and 2 will be recorded as 0, while values 3 and 4 will be recorded as 1. Because there are 6 informants who will conduct the assessment, the minimum I-CVI threshold value for each criterion is 0.83 (Wang & Sahid, 2024). For the I-CVI related to factor relevance, each factor must meet a minimum threshold of 0.83. If any factor has an I-CVI value below the threshold, the factor will be removed. Meanwhile, for the I-CVI related to grouping suitability, if any factor has a value below the threshold, the factor grouping will be discussed again and decided by universal agreement. Then, the S-CVI/average calculation is carried out by adding up the I-CVI values for each criterion and dividing them by the total. The S-CVI/average for factor relevance and grouping suitability must both reach a minimum threshold value of 0.9 for the CVI assessment to be accepted. The results of the validation are presented in table 4.

Table 4. Table CVI Result

Classification	Supporting Factors	I-CVI of Relevance of Factors	I-CVI of Classification Suitability	
			Score	Notes
Perceived Organizational Benefits	Accuracy & Efficiency	1	1	
	Transparency & Trust	1	1	
	Decision-making Support	1	1	
	Audit Quality & Scope	1	1	
	Operational Effectiveness	1	1	
	Ease of Use & Practicality	1	1	
Process Management	Change Management	1	1	
	Strategic Planning and Business Model Development	1	1	
	Public Government	1	1	
Data Privacy, Security and Governance	Regulation	1	1	
	Security	1	1	
	Data Management	1	1	
	Continuous Monitoring for Effective Control	1	1	

Data Quality	Data Management Quality Control	1	1	
People Aspect	Social Influence	1	1	
	Collaboration and Stakeholder Engagement	1	1	
	Auditor Competence & Skill	1	0.67	Auditor Aspect (different from People Aspect)
	Auditor Perception and Needs	1	0.67	Auditor Aspect (different from People Aspect)
	Auditor Certification	1	0.67	Auditor Aspect (different from People Aspect)
	Capacity Building and Training	1	1	
Organizational Aspect	Resources	1	1	
	Digital Culture	1	1	
	Management Commitment	1	1	
	Digital Leadership	1	1	
System, Tools, and Technologies	Integration Technology	1	1	
	Infrastructure Capability	1	1	
	Technological Features	1	1	
	External Support	1	1	
S-CVI		1	0,96	
Threshold		0,90	0,90	
Conclusion		Accepted	Accepted	

As can be seen in table 4, for the I-CVI scores related to factor relevance, all six informants gave a score of 3 or 4 for all presented factors. Therefore, the average I-CVI score for each factor is 1. Meanwhile, the S-CVI/average score, which is the average of the sum of the I-CVI scores, is 1, higher than the threshold of 0.9. Therefore, all presented factors are considered relevant to the research topic, and the CVI assessment for factor relevance is acceptable.

Meanwhile, in the I-CVI assessment related to grouping suitability, three factors scored 0.67 because two informants gave these factors a score of 1 or 2. The Auditor Competence and Skill, Auditor Perception and Needs, and Auditor Certification factors were deemed inappropriate when grouped under the People Aspect. These three factors were deemed more appropriate to be presented separately as the Auditor Aspect because the research topic emphasizes BDA in the audit process. After discussion, universal agreement was reached regarding the emergence of the Auditor Aspect, which includes these three factors.

The CVI validation process identified eight factors that support BDA implementation in public sector audits. These factors are outlined in Figure 4.

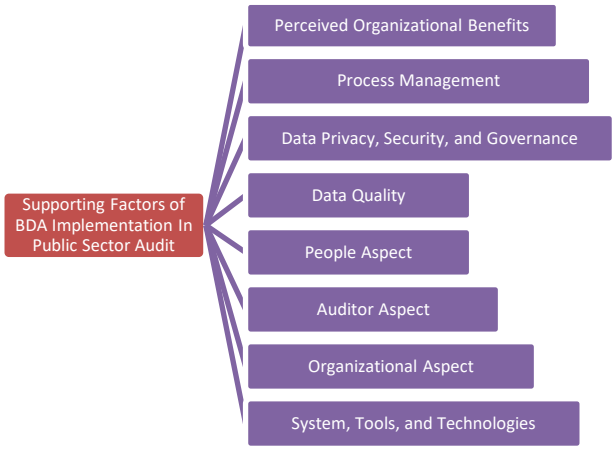

Figure 4. Supporting Factors of BDA Implementation in Public Sector Audit

Recommendation BDA Implementation for Public Sector Auditing (RQ2)

To answer the second research question (RQ2), strategies were identified to improve the implementation of BDA in public sector audits. These strategies were then classified according to the factor classification developed in the previous stage. These recommendations are shown in Table 6.

Table 5. Table Recommendation to Support Each Factor

Factors	Recommendation
Perceived Organizational Benefits	Conduct comprehensive communication explaining the benefits of BDA in audits.
	Provide tangible evidence of the benefits of BDA implementation in audits, for example by presenting performance measurement results.
	Gather accurate, relevant data to make BDA implementations more effective and equitable in public sector audits.
Process Management	Delegate oversight responsibilities to designated institutions, such as through legislation.
	Evaluate and develop organizational business processes that support the integration of audit processes with new technologies.
	Develop a strategy for implementing BDA in the audit process comprehensively, encompassing both technical and non-technical aspects.
	Develop a change management plan to support the transformation from legacy processes to new ones, including an evaluation of the organization's readiness for the transformation and the implementation process stages.
	Develop a mechanism for periodic monitoring and review to monitor the transformation and evaluate the processes implemented.
Data Privacy, Security, and Governance	Develop clear regulations and policies to ensure data security and privacy.
	Develop governance and procedures for data management that ensure data protection.
	Implement technical measures to support data interoperability from various sources and to ensure data security and privacy.

	Conduct regular monitoring and evaluation to ensure data privacy and security are guaranteed and identify gaps or deficiencies that need to be addressed.
Data Quality	Develop clear regulations and policies to ensure data quality.
	Develop strategies for data management that ensure data quality is maintained.
	Conduct regular monitoring and evaluation to ensure data quality remains reliable and to address any identified deficiencies.
	Implement technical measures to ensure data quality, such as implementing MDM.
People Aspect	Involve all stakeholders in the implementation of BDA in the audit process.
	Communicate the benefits of BDA to all stakeholders, for example through performance measurement reports.
	Encourage cross-functional communication and collaboration to share knowledge and encourage the creation of solutions and innovation.
	Establish communities or discussion forums as a means of communication, both technical and non-technical.
Auditor Aspect	Develop a curriculum or syllabus to comprehensively support the development of auditor competency in audit technology.
	Conduct ongoing training to improve auditor competency and skills in conducting analysis and using BDA tools.
	Collaborate with professionals to develop an auditor mindset for creating solutions and innovation.
	Provide programs for auditor certification.
Organizational Aspect	Develop organizational capacity and capabilities to support the integration of BDA into audit processes, both technically and non-technically.
	Develop organizational strategic plans and align business processes to support the integration of BDA into audit business processes.
	Encourage an organizational culture of continuous learning and development, while remaining unafraid of failure.
	Maintain a balance between cost efficiency and audit quality.
	Provide digital tools and infrastructure to support learning and innovation related to the implementation of BDA in audit processes.
	Conduct benchmarking with other organizations and countries to gain new insights and perspectives regarding the implementation of BDA in public sector audits.
System, Tools, and Technologies	Develop and improve the quality of the audit platform with BDA, including all involved systems.
	Develop a digital laboratory to encourage research on BDA and new technologies to support organizational adaptation and innovation.
	Utilize existing tools and technology to support the audit process.

The first of eight factors supporting BDA implementation in public sector audits is Perceived Organizational Benefit. Perceived Organizational Benefit is a factor that convinces users that the use of BDA in the audit process will provide benefits for the organization in general and individuals in particular. With this belief, auditors will be more motivated to utilize BDA in their audit processes. For the organization itself, this belief will reduce resistance to BDA integration in the audit process. One strategy that can be implemented to increase this

belief is to communicate and demonstrate concrete evidence regarding the benefits of BDA in the audit process.

Another factor supporting the use of BDA in public sector audits is Process Management. Process Management supports the targeted use of BDA and aligns it with business processes and organizational strategy. One component of this factor is Change Management, which manages change to minimize resistance. Equally important are strategic planning and business model development, which are useful for aligning business processes and organizational strategy.

Equally important than the two aspects mentioned above are privacy, security, and data governance. These aspects aim to ensure that data is properly managed through structured mechanisms. One of the goals of data management is to ensure data security and confidentiality.Furthermore, data quality is a key aspect in the use of BDA in public sector audits. Unlike the previous aspect, this aspect aims to ensure the quality of audit data. Reliable data quality will increase stakeholder confidence in the quality of audit results. Good audit quality will support the use of audit results, especially for decision-making.

The use of BDA in public sector audits is heavily influenced by human, or in this study is People factors. From a social perspective, BDA utilization is strongly influenced by how leaders and fellow auditors support its use in the audit process. Furthermore, optimal BDA utilization requires collaboration with all stakeholders, both internal and external to the organization. Equally important is the education and training process to improve the skills and competencies of human resources within the organization, enabling them to adapt to new technologies. This in turn supports the use of BDA in the audit process.

Auditor factors are separated from human factors because the focus is specifically on auditors, the primary users of BDA in the audit process in public sector organizations. This aspect emphasizes factors supporting the implementation of BDA that are directly related to auditors. Three main factors were identified: Auditor Competency and Skill, Auditor Needs and Perception, and Auditor Certification. Auditor Competence and Skill represents the auditor's ability to utilize BDA to support audits. This capability encompasses analytical skills and the ability to use BDA tools. Furthermore, the Auditor Perception and Needs factor describes the auditor's perception and need for the use of BDA to support audits. Finally, the Auditor Certification factor is directly related to the first factor, Auditor Competency and Skill. Auditor Certification is a formal recognition of the auditor's competence in utilizing BDA. This factor indicates the auditor's professionalism, which impacts the trust of other stakeholders in the auditor and their audit results.

From an organizational perspective, several factors support the use of BDA in public sector audits. These factors relate to the organization's capabilities and readiness to utilize BDA in the audit process. Given that BDA is a complex technology, organizations must have strong capabilities, including facilities and infrastructure, human resources, and finance. In implementing new technologies like BDA, organizations must have strategies and policy directions that support process changes. This is necessary to support the transformation process, including by minimizing resistance.

Supporting the use of BDA in public sector audits is, of course, inseparable from the technological aspect. Technology plays a crucial role in various aspects of BDA utilization. Technology is needed to improve the reliability of BDA systems in supporting data analysis.

Furthermore, technological integration is also necessary to protect the security and privacy of data within BDA. Furthermore, with technological support, the quality of input and output data can be standardized. By integrating reliable technology into BDA utilization, organizations are expected to comply with applicable regulations.

CONCLUSION

A considerable amount of previous research has examined the implementation of BDA. However, only a limited number of studies have focused on its application in audit processes, particularly within the public sector. Between 2021 and 2026, out of 2,485 articles identified, only 32 addressed supporting factors for BDA implementation in public sector auditing. Seventy-eight percent of these articles were published in journals, while the remaining 22% were presented at conferences. The studies covered various geographic regions, including Indonesia, Europe, Malaysia, Spain, the United States, Germany, the Netherlands, Ukraine, and Jordan. This distribution indicates that research on BDA in public sector auditing continues to develop across different countries.

This study found that the implementation of BDA in public sector auditing requires support from multiple factors. These factors are not limited to technical aspects but also include organizational and stakeholder-related dimensions. Eight key factors were identified as supporting the implementation of BDA in public sector auditing: perceived organizational benefits, process management, data privacy, security and data governance, data quality, human aspects, auditor aspects, organizational aspects, and systems, tools, and technologies. Based on these factors, relevant recommendations were mapped to support the effective implementation of BDA in public sector auditing.

This research addresses a highly specific topic, namely the application of BDA in public sector auditing, which has been limitedly explored in prior studies and therefore represents a research gap. Furthermore, this study employed the Content Validity Index (CVI) method to ensure that the identified factors were relevant to the research context. Unlike previous studies that primarily adopt a general human resource or user perspective, this study specifically emphasizes the auditor perspective.

A limitation of this study is that it only identifies factors supporting the implementation of BDA in public sector auditing. The relationships among these factors and the extent of their influence were not examined. Future research could address this gap by developing a more structured model and strategy to enhance the implementation of BDA in public sector auditing.

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