

ANALYSIS OF FAILED STUDENT MANAGEMENT SYSTEM AND ITS IMPACT ON EDUCATIONAL INEQUALITY IN 3T REGIONS

Aziza Turrohmah¹, Siti Aimah²

¹Islamic education management, KH. MUKHTAR SYAFA'AT

²Islamic education management, KH. MUKHTAR SYAFA'AT

Email : Azizaturrohmah75@gmail.com¹, sitiaimah1@iaida.ac.id²

E-Issn: 3063-8313

Received: Oktober 2024

Accepted: Oktober 2024

Published: November 2024

Abstract :

This study aims to analyze the failure of the student management system in Indonesia and its impact on educational inequality, especially in the 3T (Frontier, Remote, and Disadvantaged) areas. The main focus of the study is how weak data collection, distribution, and monitoring of students cause imbalances in access and quality of education in areas with limited infrastructure and resources. The method used is a qualitative approach with case studies in several junior high schools in East Seram Regency, Maluku Province. Data collection techniques were carried out through in-depth interviews with school principals, teachers, and school data managers, as well as document analysis and field observations. The results of the study indicate that the student management system that is not running optimally – such as errors in student data, delays in integration with the central system, and lack of HR training – contributes to the uneven allocation of educational assistance and limited policy interventions. This study makes an important contribution in strengthening the urgency of an inclusive and adaptive education data management system to the geographical and social context of the 3T areas, in order to create justice and equity in education throughout Indonesia.

.Keywords : Management, Education, Students, 3T

Abstrak :

Penelitian ini bertujuan untuk menganalisis kegagalan sistem manajemen peserta didik di Indonesia dan dampaknya terhadap ketimpangan pendidikan, khususnya di daerah 3T (Terdepan, Terpencil, dan Tertinggal). Fokus utama penelitian adalah bagaimana lemahnya pendataan, distribusi, serta pemantauan peserta didik menyebabkan ketidakseimbangan akses dan kualitas pendidikan di wilayah-wilayah dengan keterbatasan infrastruktur dan sumber daya. Metode yang digunakan adalah pendekatan kualitatif dengan studi kasus di beberapa sekolah menengah pertama di Kabupaten Seram Bagian Timur, Provinsi Maluku. Teknik pengumpulan data dilakukan melalui wawancara mendalam dengan kepala sekolah, guru, dan pengelola data sekolah, serta analisis dokumen dan observasi lapangan. Hasil penelitian menunjukkan bahwa sistem manajemen peserta didik yang tidak berjalan optimal seperti kesalahan data siswa, keterlambatan integrasi dengan sistem pusat, serta kurangnya pelatihan SDM – berkontribusi pada pengalokasian bantuan pendidikan yang tidak merata dan terbatasnya intervensi kebijakan. Penelitian ini memberikan kontribusi penting dalam memperkuat urgensi reformasi sistem manajemen data pendidikan yang inklusif dan adaptif terhadap konteks geografis serta sosial daerah 3T, demi menciptakan keadilan dan pemerataan pendidikan di seluruh Indonesia.

Kata Kunci: Manajemen, Pendidikan, Peserta Didik, 3T

INTRODUCTION

The development of education in Indonesia is currently experiencing a large gap in access to technology between 3T areas and urban areas. This is due to the lack of technological infrastructure in the outermost and remote areas, such



as slow or no internet connections (Azkiyah et al., 2025) . Real evidence was found in several schools in East Seram, where student data could not be updated online due to limited internet access. This condition causes schools to be uninvolved in central data management systems such as Dapodik (Basic Education Data). In conclusion, the failure of the student management system in the 3T areas is not only due to technical negligence, but also due to structural injustice in the distribution of technological facilities.

The quality of human resources in the 3T areas is also a factor that exacerbates the failure of the student management system. The main reason is the lack of technical training and assistance for teachers and school administration staff (Aprilia et al., 2024) . In some cases, school operators admitted that they had never received official training in operating the Dapodik application. This evidence was found through interviews with several school administration staff in the Maluku area. As a result, data input is inaccurate or delayed, which leads to errors in the distribution of educational assistance. In conclusion, without strengthening human resource capacity, the student management system will not run effectively in the 3T areas.

Inequality in the distribution of educational assistance, such as the Smart Indonesia Program (PIP), due to inaccurate or unregistered student data (Maharani et al., 2024) . The main reason is the failure of the system to reach and validate student data from remote areas. Evidence was found when several poor students did not receive assistance because their names were not listed in the central system. This case shows that data inequality directly impacts inequality in educational assistance. In conclusion, data management failures directly contribute to the unfair distribution of educational resources.

Many schools in 3T areas have not been able to actively participate in the national education digitalization policy. The main reason is that the education management system is too centralized and does not consider the local context (Alfiansyah, 2024) . This evidence can be seen from the low number of online school data reporting and participation in the digital-based national evaluation system. Schools in Maluku, for example, still rely on manual reporting due to access and technical barriers. In conclusion, the student management system fails to be an inclusive tool that can involve all schools equally, thus reinforcing educational inequality.

Another social fact is that the top-down student management system policy is often irrelevant to social conditions in the 3T areas (Rahmawati et al., 2021) . The main reason is the lack of involvement of schools and local communities in system design. Evidence is found in the form of inconsistencies in reporting schedules with local calendars, or data formats that do not suit the needs of small schools in remote villages. This causes schools to have difficulty adapting, which has an impact on data accuracy and continuity. In conclusion, the failure of the student management system is also the result of policies that are not responsive to the social and geographical realities of the 3T areas.

This study aims to examine the challenges in the Indonesian education system, especially in the 3T (Frontier, Outermost, and Disadvantaged) regions. Despite the government's efforts, there are still significant gaps in access and quality of education between developed and disadvantaged regions. Key issues

include uneven distribution of resources, limited infrastructure, and a lack of qualified educators. Financial resource management strategies are critical to improving education in 3T regions, with recommendations to strengthen collaboration between the central and regional governments (Nasir et al., 2023). This study suggests several approaches to address these challenges, including implementing learning aspects, adapting to curriculum changes, improving infrastructure, improving education programs, and increasing motivation to learn. Ultimately, this study emphasizes the need for inclusive, data-driven policies and community engagement to strengthen Indonesia's education system and achieve greater equity.

This study offers a novelty by specifically highlighting the failure of the student management system as the root cause of educational inequality in the 3T regions—an approach that has not been studied in depth in previous studies. While previous studies have focused more on resource distribution, teacher quality, or infrastructure, this study explores how weaknesses in student data management, such as input errors, late reporting, and minimal digital system integration, have a direct impact on the inequality of education policies and aid distribution. This approach is unique because it not only looks at the problem at the macro policy level, but also highlights the technical and administrative aspects that are often overlooked but have a major impact on educational equity. Thus, this study enriches the literature on education in Indonesia with a new focus that links the failure of the education information system to structural inequality in the 3T regions, and provides recommendations for reform based on data and local needs.

This research is very worthy to be conducted considering the still high level of educational inequality in the 3T (Frontier, Remote, and Disadvantaged) areas that have not been systematically resolved, even though various equalization programs have been implemented. One of the roots of the problem that is often overlooked is the failure of the student management system, which includes inaccurate data collection, late reporting, and the lack of digital system integration between schools and the central government. This failure has a direct impact on the distribution of aid, policy planning, and the provision of fair and equitable education services. In fact, student data is an important foundation in decision-making in the education sector. Therefore, it is important to conduct a study that specifically analyzes the problem of student management as part of efforts to improve educational inequality in the 3T areas. This research is not only academically relevant, but also has high practical value in encouraging data-based, inclusive, and social justice-oriented policies in the field of education.

RESEARCH METHOD

The chosen research location is MTsS Buppi in East Seram Regency, which is included in the 3T (Frontier, Remote, and Disadvantaged) region. The selection of this location is very relevant to the research title because MTsS Buppi faces various challenges in the student management system, such as limited access to technology, difficulties in student data collection, and the lack of human resources skilled in data management. This condition reflects the real problems

that occur in the 3T area and its impact on educational inequality. The study at MTsS Buppi allows for an in-depth analysis of the failure of student management and its implications for educational equity in the region.

The qualitative approach with a case study type is very relevant to use in the study entitled "Analysis of the Failed Student Management System and Its Impact on Educational Inequality in the 3T Region" because the focus of this study is to deeply understand the phenomenon of student management system failure in a real and specific context. The qualitative approach allows researchers to explore complex factors that influence the failure, such as technical, social, and cultural constraints that are difficult to measure with quantitative data alone. Case studies allow for detailed analysis of one particular location or unit in this case MTsS Buppi in the 3T region as a representation of general conditions in similar areas. Through interviews, observations, and documentation, researchers can explore the experiences, perceptions, and practices of student data management from various stakeholders holistically. Thus, this approach not only produces a rich and contextual understanding, but also provides a detailed picture of the impact of the system's failure on educational inequality in areas that have unique geographic and social challenges such as the 3T region.

In the study entitled "Analysis of Failed Student Management Systems and Their Impact on Educational Inequality in 3T Regions," the use of primary and secondary data sources is very important to obtain a comprehensive picture. Primary data was obtained directly from the field through interviews with the principal, teachers, and administrative staff responsible for managing students at MTsS Buppi. In addition, observation and documentation at the school were also part of the primary data collection. Meanwhile, secondary data was obtained from official reports, education policy documents, and previous research relevant to the context of the 3T region. The combination of these two types of data allows for a more in-depth and valid analysis, so that it can accurately describe the causes of the failure of the student management system and its impact on educational inequality. The following is a table of research informants based on the context of MTsS Buppi that is relevant to the study:

Table 1.1 Research informants

No	Informant Criteria	Informant Code	Gender	Amount
1	Headmaster	KS	M/W	1
2	Teacher	GP	M/W	4
3	School Administration Staff	SA	M/W	2

Source: research results

Description:

KS = Headmaster

GP = Teacher

SA = School Administration Staff

In this study, informants consisted of the principal, teaching staff, and administrative staff of MTsS Buppi with male and female representatives.

Data collection techniques used include interviews, observations, document studies, and video analysis. In-depth interviews were conducted with principals, teachers, and administrative staff to explore their experiences and obstacles in managing student data. Field observations were conducted to directly observe the data management process and the condition of the school environment. Document studies include analysis of official reports, administrative records, and policies related to student management. In addition, video analysis was used to study recorded data management activities and interactions in the school environment, thereby enriching qualitative data and providing a more complete contextual picture of the failure of the student management system in the 3T area.

In this study, the data analysis technique used refers to the Miles and Huberman model, which includes three main stages, namely data reduction, data presentation, and drawing conclusions or verification. This process allows researchers to manage and interpret data systematically and in depth, so that research findings can be more valid and reliable. To ensure the validity of the data, this study applies triangulation checking techniques using source triangulation, method triangulation, and observer triangulation. Source triangulation is carried out by comparing data from various informants, method triangulation uses several data collection techniques such as interviews, observations, and document studies, and observer triangulation involves more than one researcher or observer in the process of data collection and analysis. This approach increases the credibility of research results related to the failure of the student management system in the 3T area.

FINDINGS AND DISCUSSION

Failure to Record Student Data Causes Inaccuracy in Distribution of Educational Assistance

The failure of the student management system mainly occurs in the process of inaccurate and incomplete student data collection. The main reasons for this failure are limited access to technology in the 3T areas, lack of training for school data operators, and data collection procedures that are not flexible to local conditions (Fitriyah & Vita Novianti, 2025) . Evidence was found through interviews with administrative staff at MTsS Buppi who admitted that they often had difficulty updating student data online due to weak internet signals and limited devices. In addition, there were cases of students who should have received educational assistance but were not recorded in the system, so they failed to receive support.

"We often have difficulty updating student data because internet access here is very limited and unstable. Sometimes the devices we have are also inadequate to operate the online data collection application."

From the statement it shows that limited internet access and inadequate devices are the main obstacles in the process of updating student data online at MTsS Buppi. This indicates that inadequate technological infrastructure directly

interferes with the effectiveness of the student management system, potentially causing inaccurate data and delays in reporting (Abdiyantoro et al., 2024) . As a result, the decision-making process and distribution of educational assistance are less targeted, exacerbating educational inequality in the 3T areas.

Lack of Human Resources Capacity in Managing Student Management Systems

The lack of human resource (HR) capacity in schools in 3T areas in managing student management systems effectively (Mulyanti, 2025) . The main factor is the lack of ongoing training and mentoring for teachers and administrative staff in operating data collection applications such as Dapodik. This is reinforced by the results of interviews which show that most data operators at MTsS Buppi have never received formal training, so they rely on limited experience which often leads to data input errors. Other evidence is the inconsistency of student data found in school administration documents. In conclusion, without increasing HR capacity, student data management will remain weak, which will result in data inaccuracy and inequality in the planning and implementation of education programs in 3T areas.

The following table contains standards, targets, and analysis results based on the presentation of the lack of human resource capacity in managing student management systems in 3T areas:

No	Analysis Aspects	Standard	Target	Analysis Results
1	Human Resources Capacity (Teachers & Staff)	Educators and education personnel understand student management and data collection applications.	All data operators have attended official training at least once a year.	The majority of operators at MTsS Buppi have never received formal training, so they only rely on personal experience and cause many input errors.
2	Use of Dapodik Application	Use of the application according to SOP and accurately	Student data is 100% valid and synchronized with physical documents	Numerous input errors and data inconsistencies were found between the system and physical documents, indicating a weak technical understanding of application usage.
3	Training & Mentoring Support	Regular training and mentoring programs are available for operators.	Minimum 2 training or mentoring per year.	There is no regular training provided, either by the local government or related educational institutions.
4	Administrative Data Quality	Student administrative data is complete, accurate and well documented.	Data accuracy reaches 95% or more	Data discrepancies were found in school administration documents, indicating a weak data verification and validation

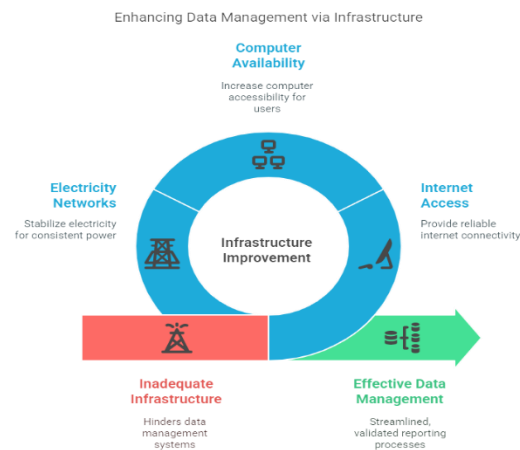
No	Analysis Aspects	Standard	Target	Analysis Results
				system.
5	Data-Based Educational Planning	Program planning is carried out based on accurate and up-to-date data.	All programs are based on validated data	Data inaccuracy causes disparities in the planning and implementation of education programs in 3T areas.

The table above illustrates the discrepancy between the standards and targets for managing the student management system with the actual results found at MTsS Buppi, a school in the 3T area. The standard that requires data operators to undergo regular formal training has not been met, because most operators only rely on personal experience without adequate assistance (Raharjo, 2023) . As a result, their ability to operate data collection applications such as Dapodik is limited, so that data input errors often occur. These errors cause inconsistencies in student data recorded in school administration documents. This condition has a direct impact on the inaccuracy of data that is the basis for planning and implementing education programs. Because the data is invalid and out of date, education program planning in the 3T area becomes less effective and less targeted. Thus, the lack of human resource capacity in terms of training and mastery of technology contributes significantly to the failure of the student management system, which then exacerbates educational inequality in the region. Efforts to improve human resource capacity are very important to improve this condition (Mujib et al., 2024) . In conclusion, without increasing human resource capacity, student data management will remain weak, resulting in data inaccuracy and inequality in the planning and implementation of education programs in 3T areas.

Unavailability of Technology Infrastructure Supports Data Management System Failure

Limited technological infrastructure is a major obstacle to the success of student management systems in 3T areas (Munir & Su'ada, 2024). ;Latifah, 2024). The main reasons are very limited internet access, minimal availability of computer devices, and unstable electricity networks at MTsS Buppi and its surroundings. Field observations and interviews revealed that schools often experience internet connection disruptions, so that data cannot be uploaded or updated in a timely manner to the central system. This hampers the process of validating and integrating student data. This evidence is reinforced by the record of repeated delays in data reporting. In conclusion, without improving technological infrastructure, the student management system in the 3T areas will not run optimally, thus prolonging the educational gap with other more advanced areas.

Figure 1.1 data management effectiveness



The figure shows the close relationship between infrastructure improvement and data management effectiveness. Adequate infrastructure is a major factor in ensuring smooth, more structured and efficient data management. The three key elements emphasized in this diagram are computer availability, internet access, and electricity network. Better computer availability increases user accessibility to data systems, while stable internet connectivity allows for smoother information flow (Wibowo, 2023; Pratama, 2023) . Likewise, inadequate building facilities make learning less effective. As evidence of government assistance to support more adequate facilities.

Figure 1.2 government visit providing assistance



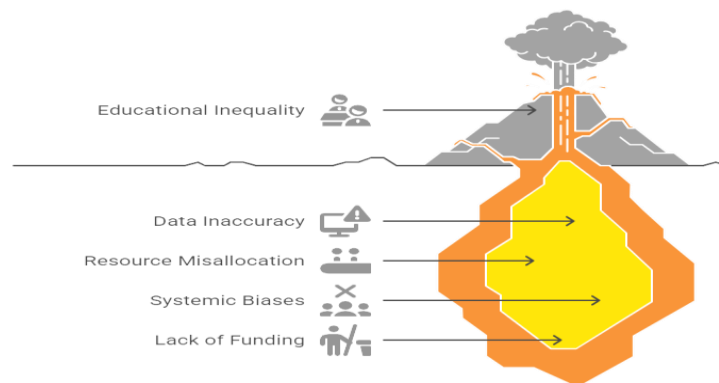
In addition, reliable power transmission ensures the operational continuity of digital devices and data management systems. This diagram also highlights the impact of inadequate infrastructure, which can hamper data management systems and lead to ineffectiveness in reporting information. Conversely, proper infrastructure improvements support more effective data management systems, with more standardized and validated reporting processes. In other words, infrastructure improvements play a key role in

creating a more optimal digital ecosystem, enabling maximum use of technology for various information and operational needs. Therefore, investment in infrastructure is a strategic step in developing a more reliable and efficient information system (Simarmata & Situmorang, 2023; Sawir, 2024) . In conclusion, without improving technological infrastructure, the student management system in 3T areas will not run optimally, thus prolonging the educational gap with other more advanced areas.

The Direct Impact of Student Management System Failure on Educational Inequality

The failure of the student management system has a direct impact on educational inequality in the 3T areas (Wika, 2025; Simbolon et al., 2025) . The main reason is that data inaccuracy hinders effective planning and allocation of educational resources, including financial assistance, facilities, and student support programs. Evidence is found in the imbalance in the number of students recorded in the system compared to the real conditions in the field, so that many students are not covered by government programs. This impact is reinforced by testimonies from teachers who see students who have difficulty following learning because they do not receive adequate support.

Figure 1.2 infrastructure improvements at Mtss Buppi school



This figure emphasizes that infrastructure improvement is a key factor in achieving more effective data management. The three main elements that contribute to this are the electricity network, computer availability, and internet access. The availability of computers provides wider access for users to data processing systems, allowing for more efficient and structured information processing. Stable internet access supports smooth communication and data exchange, allowing for real-time information synchronization (Rachmad et al., 2024 ; Nooriansyah et al., 2025) . Meanwhile, a reliable electricity network ensures that devices operate without interruption, ensuring the continuity of continuous digital activities. This diagram also shows the impact of inadequate infrastructure, which can lead to ineffectiveness in reporting and data management. Conversely, with proper infrastructure improvements, data management systems can operate more optimally, producing validated and standardized reports (Utoyo, 2024 ; Tamiri, 2025) . The overall concept in this diagram reflects that investment in infrastructure improvement is not just about improving physical facilities, but also a fundamental strategy for building a more

efficient and reliable digital ecosystem. With a holistic approach to infrastructure development, the effectiveness of data management can be improved sustainably, supporting various information and operational needs in various sectors (Azizah et al., 2024 ; Lahagu et al., 2024) . In conclusion, the failure of student data management widens the gap in access and quality of education between 3T areas and other areas, thus requiring strategic intervention to improve the system and balance learning opportunities for all students.

CONCLUSION

The failure of the student management system in 3T areas such as that which occurred at MTsS Buppi was the result of a combination of various interrelated structural and technical factors. Limited technological infrastructure, such as unstable internet access, lack of computer devices, and unreliable electricity networks, were the main obstacles in the process of recording and reporting student data. In addition, the lack of human resource capacity, especially data operators who had never received official training, resulted in low ability to operate data collection applications such as Dapodik, resulting in many data input errors and information inconsistencies. The impact of these problems is very significant, especially in the context of the distribution of educational assistance which is not on target due to inaccurate data. As a result, many students who are actually eligible to receive assistance are missed from the system. This exacerbates the educational inequality between 3T areas and more developed areas. To overcome this problem, strategic intervention is needed through increasing human resource capacity, simplifying data collection procedures, and serious investment in developing technological infrastructure as the main foundation for reliable and sustainable data management.

REFERENCE

- Abdiyantoro, R., Daheri, M., Warlizasusi, J., & Sumarto, S. (2024). The Role of E-Performance Operators in the Process of Preparing a Teacher's Monitoring Data. *Indonesian Journal of Multidisciplinary on Social and Technology* , 2 (3), 29–34.
- Alfiansyah, A. (2024). Design and implementation of mobile-based network service technology learning media: An innovative approach to education. *Journal Creativity* , 2 (1), 121–132.
- Aprilia, E., Afindi, A., & Saputra, H. (2024). Case Study of Educational Resource Utilization. *Journal of Education, Language and Culture* , 3 (4), 112–124.
- Azizah, M., Solikhin, S., & Lailiyah, N. (2024). Implementation of Management Information Systems in Supporting Administrative Services. *Ngaos: Journal of Education and Learning* , 2 (2), 80–94.
- Azkiyah, SR, Aryola, G., & Lukitoaji, BD (2025). Issues of Educational Disparities in Remote Areas: Solutions to Realize Equitable Education. *EDUCREATIVA: Journal of Educational Issues and Innovations* , 1 (1).
- Fitriyah, NS, & Vita Novianti, VN (2025). IMPLEMENTATION OF LIBRARY AND ARCHIVES DIGITALIZATION PROGRAM (UMBLING ROPE) AT THE LIBRARY AND ARCHIVES SERVICE OF SITUBONDO REGENCY . ABDURACHMAN SALEH UNIVERSITY OF SITUBONDO.

- Lahagu, SE, Kustiawan, B., & Adhicandra, I. (2024). *Educational management: Comprehensive theory & reference for the development and advancement of education in Indonesia*. PT. Sonpedia Publishing Indonesia.
- Latifah, A. (2024). Transformation of Islamic education management in the digital era. *An Najah (Journal of Islamic Education and Socio-Religious Affairs)*, 3 (2), 46–51.
- Maharani, N., Khoirunnisa, N., & Putri, SP (2024). Analysis of Social Disparity Problems in Elementary Schools. *PARADIGM: Journal of Multidisciplinary Research and Innovation*, 2 (01), 1–16.
- Mujib, H., Agung, A., Yuwita, ER, & Samsuri, AA (2024). Empowering Women in Increasing Income Through Paper Waste Processing in Dewasari Village, Ciamis. *Indonesian Journal of Community Dedication*, 2 (1), 153–163.
- Mulyanti, D. (2025). Educational Management Strategy in the Digital Era: Optimizing Infrastructure, Human Resources, and Technology-Based Learning. *Pelita Nusantara Journal*, 2 (4), 376–383.
- Munir, M., & Su'ada, IZ (2024). Islamic education management in the digital era: Transformation and challenges of implementing educational technology. *JlEM: Journal Of Islamic Education and Management*, 5 (1), 1–13.
- Nasir, M., Mahmudinata, AA, Ulya, M., & Firdaus, FA (2023). School empowerment strategy as an effort to improve educational management. *Journal of International Multidisciplinary Research*, 1 (2).
- Nooriansyah, S., Kom, M., Khairati, F., Kom, M., Maulina, D., Kom, S., Kom, M., Esso, ASR, Din, T., & Bakri, AA (2025). *INTEGRATION OF INFORMATION SYSTEMS IN COMPANIES*. CV Rey Media Grafika.
- Pratama, IPAT (2023). Using the Sketchbook Application on Smartphones to Create a Variety of Creative Experiences in Creating Art in Fine Arts Study Programs. *Undiksha Fine Arts Education Journal*, 13 (2), 108–118.
- Rachmad, YE, Ilham, R., Indrayani, N., Manurung, HE, Judijanto, L., Laksono, RD, & Sa'dianoor, S. (2024). *E-Government Services and Governance: Theory, Concepts and Applications*. PT. Green Indonesian Library.
- Raharjo, B. (2023). Ethical Theory in Artificial Intelligence (AI). *Publisher Yayasan Prima Agus Teknik*, 1–135.
- Rahmawati, ET, Apriliani, E., & Diantoro, F. (2021). Improving curriculum substance through innovation in facing the problems of the 4.0 revolution era. *Al Yasinii: Journal of Islam, Social, Law and Education*, 6 (1), 91–113.
- Sawir, M. (2024). Optimizing Information Technology to Accelerate Good Governance in Investment Services in Papua. *Indonesian Journal of Intellectual Publication*, 4 (2), 30–41.
- Simarmata, D., & Situmorang, DM (2023). Implementation of the Batam City Accounting Information System. *Bukit Pengharapan Entrepreneurship Journal*, 3 (1), 38–51.
- Simbolon, JRL, Utami, SM, & Lestari, A. (2025). Effectiveness of the Online New Student Admissions System (PPDB) in Increasing Transparency and Quality of Educational Services. *Jurnal Intelek Insan Cendikia*, 2 (5), 8514–8521.
- Tamiri, MH (2025). *Development of Creatorku Business Ideas using the Lean Startup Method*. Islamic University of Indonesia.
- Utoyo, I. (2024). *Making the Giant Dance: The Story Behind BRI's Digital*

- Transformation Journey* . PT. Rayyana Komunikasindo.
- Wibowo, HS (2023). *Development of Learning Media Technology: Designing Innovative and Effective Learning Experiences* . Tiram Media.
- Wika, M. (2025). Between Commitment and Reality: A Qualitative Study of Education Equity Policy in Remote Areas of Merauke. *RIGGS: Journal of Artificial Intelligence and Digital Business* , 4 (1), 89–96.