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Institutional Challenges in Implementing DAPODIK as a Basis for Education Decision-Making in Indonesia

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ABSTRACT

The Data Pokok Pendidikan (DAPODIK) system serves as the primary foundation for educational data management and policy decision-making in Indonesia. However, persistent institutional challenges continue to affect the accuracy and reliability of the data. This research aims to identify and analyze the institutional obstacles that hinder the effective implementation of DAPODIK. Using a descriptive qualitative method, the study explores three key dimensions: infrastructure, institutional structure, and human resources. The findings reveal that (1) inadequate internet connectivity and unstable electricity disrupt data entry and synchronization; (2) weak policy integration, limited budgets, and inconsistent leadership commitment impede effective data governance; and (3) insufficient training for school operators reduces technical competence, thereby compromising data validity. These findings highlight the need for a comprehensive reform strategy that strengthens digital infrastructure, enhances institutional governance, and develops human resource capacity to ensure reliable education data management.

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1. INTRODUCTION

The Data Pokok Pendidikan (DAPODIK) is a national data collection system designed to provide accurate information to support educational planning, budgeting, and service quality improvement. Although widely implemented, the system still faces several obstacles, including low data validity, weak cross-level coordination, and suboptimal information use for strategic planning. One of the causes is the limited technical capacity of school operators as the primary data input implementers, which has not been matched with adequate training and support. [1] assessed that minimal technical training and weak supervision affect data quality degradation. Yasin and Elsalina [2] also noted that the use of DAPODIK remains administrative and has not served as a basis for evidence-based policy

analysis. A survey by Handayani et al. [3] revealed that 72% of respondents use data only for immediate needs and have not yet seen it as a long-term decision-making tool.

Digital governance is a transformation of government administration that uses digital technology to increase transparency, accountability, and the quality of public services [4]. In various countries, the implementation of this concept has driven bureaucratic modernization, increased government responsiveness, and expanded public participation in decision-making. However, its implementation often faces fundamental obstacles, such as limited technological infrastructure, low digital literacy, and regional capacity disparities, resulting in implementation gaps [5], [6], [7]. The principles of digital governance are highly relevant to the education sector, particularly through an integrated, digital-based data-collection system such as DAPODIK. Designed as a national database, DAPODIK collects comprehensive educational information on teachers, students, educational units, and infrastructure, and serves as a strategic tool for policy-making [8]. Its role has evolved from a mere administrative tool to a public policy instrument supporting evidence-based education governance, linking actual data with policy formulation processes to promote transparency and accountability.

As technological advancements accelerate, the integration of big data has strengthened DAPODIK's capacity to manage and analyze large-scale educational data [9]. Through integrated data collection, processing, and presentation mechanisms, DAPODIK provides statistical information accessible to various stakeholders at central, regional, and school levels [10], [11]. Access to valid, accurate, and up-to-date data [12], [13] not only simplifies reporting but also reinforces transparency, efficiency, and accountability in education governance. Consequently, DAPODIK embodies the practical application of digital governance principles in the education sector, contributing to the development of a more inclusive and adaptive national education system.

Institutional challenges are obstacles that organizations face in carrying out their functions and achieving their goals. These include structural issues, limited resources, inconsistent regulations, less adaptive organizational cultures, and dynamic external environments. According to Gottschalk and Hamerton [14], institutional challenges arise when formal and informal rules fail to function effectively, thus hindering performance. In the Indonesian bureaucracy, such challenges are often linked to low professionalism, weak coordination, and difficulties in policy implementation [15], aligning with Utami [16], who emphasizes inefficiency and weak adaptability in public institutions. Similarly, Moshtari and Safarpour [17] identify bureaucratic rigidity, technological limitations, and low individual capacity as factors that reduce institutional competitiveness, while Owens et al. [18] and Chaparro-Medina et al [19] point out accountability gaps and adaptation difficulties in digital transformation contexts. These factors help explain why systems like DAPODIK, despite their potential, continue to face issues of data validity, consistency, and utilization for policy purposes.

From a technical standpoint, DAPODIK also struggles with system integration and uneven technical training across regions. Datu et al. [20] reported an 18% data residue due to limited operator competence and incomplete system integration, indicating weak institutional readiness. Furthermore, Aulia [21] found that technical training occurs only

once every two years, leaving many operators behind on system updates and resulting in data inconsistencies. Inconsistent regulations, weak evaluation mechanisms, and inadequate budget allocations for human resource development compound these issues. Hence, DAPODIK's problems are not merely technical but also institutional, reflecting weak governance structures that are fundamental to effective data management.

Decision-making, as explained by Samancı and Mazlumoğlu [22], is a rational process involving problem identification, alternative evaluation, and the selection of optimal actions under uncertainty and constraints. Various models and techniques have been developed to enhance decision quality [23], while Vitt [24] emphasizes that social and psychological dynamics also influence decision-making. The concept of decision-making under fuzziness introduced by Kahraman and Haktanır [25] and multicriteria analysis [26] demonstrates approaches for dealing with complex, uncertain contexts. In Indonesia, Handayani et al. [12] highlight that data-driven decision-making improves accuracy and accountability. However, Mubarok and Samran [10] found that DAPODIK is still widely used for administrative functions, such as BOS distribution, highlighting a gap between data availability and utilization. Institutional support and stakeholder engagement are therefore crucial to ensure relevant and effective policy outcomes [27], while the integration of big data and AI offers new opportunities despite infrastructural and institutional limitations [28].

Although many studies acknowledge that DAPODIK has improved administrative efficiency, transparency, and accountability in education management [29], Rodiyah [30] argues that its effectiveness depends heavily on human resource readiness, IT infrastructure, and technological adaptation. Persistent challenges such as limited operators, weak connectivity, and frequent system changes hinder optimal use. Unequal access to training further contributes to disparities in data management capacity across regions.

However, most previous studies focus on technical and administrative aspects, leaving institutional dimensions underexplored. Effective education data systems depend not only on technology but also on coordination, institutional capacity, and policy synergy between central and local governments. Mubarok and Samran [10] and Bagus et al [29] highlight frequent misalignments between central policies and field practices, especially regarding data flow and inter-institutional communication, which limit DAPODIK's potential as a decision-making instrument. Therefore, institutional analysis is crucial to understanding underlying barriers beyond technical limitations.

This study aims to analyze institutional factors affecting DAPODIK management, focusing on infrastructure, organizational coordination, and operator capacity. This focus underscores that data quality depends not only on technological tools but also on the institutional ecosystem supporting effective data collection and utilization.

2. METHOD

Research Design

This research employs a descriptive, qualitative case study approach to deeply explore the institutional challenges in implementing the DAPODIK system. This approach was chosen because it provides a detailed, contextual, and comprehensive understanding of the educational institutional dynamics involved. According to Sugiono [31], the descriptive

approach aims to systematically and scientifically explain and validate a phenomenon. Similarly, Furidha [32] emphasizes that descriptive research enables an objective and accurate portrayal of the subject under study, thereby fostering a comprehensive understanding of complex institutional realities. Therefore, this approach is considered highly relevant for uncovering the multifaceted challenges of DAPODIK management within Indonesia's educational governance framework.

Research Site and Participants

The study was conducted in a formal educational environment directly involved in DAPODIK management, encompassing both the school level and the Education and Culture Department of Aceh Jaya Regency. This location was selected because it represents the entire DAPODIK data management cycle, from data collection to utilization in policy-making. The informants consisted of six key actors who play strategic roles in the DAPODIK workflow: two school principals and four structural officials from the Education and Culture Department (the department head, the secretary, and two division heads). These participants were selected purposively based on their direct involvement in DAPODIK operations for at least two years, ensuring that each informant possessed adequate practical experience in data validation, operational management, and policy formulation based on educational data.

Data Collection

Three data collection techniques were employed: structured interviews, direct observation, and document analysis. Structured interviews were conducted to explore stakeholders' experiences, perceptions, and challenges in managing DAPODIK [33]. Each interview lasted approximately 45–60 minutes and was recorded with participants' consent. Direct observations were conducted at selected schools and government offices to examine data entry, verification, and synchronization processes, providing contextual and empirical insight into field practices. Meanwhile, document analysis, including Standard Operating Procedures (SOPs), circulars, and DAPODIK reports, was conducted to identify the regulatory and administrative frameworks that guide implementation. The use of multiple techniques allowed for triangulation to enhance data validity and ensure comprehensive coverage of the research objectives.

Data Validation and Ethical Considerations

To ensure research trustworthiness, member checking was conducted by sharing summarized findings with participants to confirm accuracy and interpretation. Additionally, peer debriefing was carried out with academic colleagues to verify analytical consistency, and an audit trail was maintained to document all stages of data handling and analysis. Ethical research protocols were strictly followed. Prior permission was obtained from the Aceh Jaya Education and Culture Department, and all participants provided informed consent after being briefed about the study's purpose and procedures. Confidentiality and anonymity were guaranteed by assigning pseudonyms and omitting identifying details in all reports and publications.

Data Analysis

Data analysis was conducted inductively using a thematic approach. The process began with data reduction, in which transcripts, observation notes, and documents were reviewed and organized. The researcher then carried out initial coding to identify recurring patterns related to DAPODIK challenges. Through iterative refinement, codes were grouped into major themes, including *technical constraints, limited human resources, weak inter-institutional coordination,* and *policy misalignment*. Thematic categorization was supported by manual coding and cross-verification to ensure consistency and depth of interpretation. Each theme was then developed into a descriptive narrative that demonstrated the logical interconnections among institutional, infrastructural, and human resource elements. This analytical process provided a comprehensive understanding of the institutional challenges surrounding DAPODIK implementation in the study area.

Table 1. Informant's Description

RC	Researchers
KP	Head of the Education Department
SD	Secretary of the Education Department
KD1	Head of Basic Education Development Division
KD2	Head of Human Resources Development Division
KS1	Principal 1
KS2	Principal 2

To support the systematization of data presentation, a unique code is assigned to each informant. The researcher himself is coded as RC, acting as the primary data collector and analyst. The Head of the Education Department is coded as KP as the policy authority holder, while the department's secretary is coded as SD, with a coordinating and administrative role. The Head of the Basic Education Development Division is coded KD1 due to his responsibility for basic education management, and the Head of the Human Resources Development Division is coded KD2, who handles educational human resource issues. On the other hand, two school principals from different institutions are coded as KS1 and KS2, respectively. The use of this coding system aims to maintain the confidentiality of informants' identities while facilitating data reading and retrieval in the presentation of research results, thereby making the results more concise, structured, and easy to understand.

3. RESULTS AND DISCUSSION

3.1. Inadequate Infrastructure

This research was conducted with the primary objective of critically analyzing the institutional challenges faced in utilizing DAPODIK data as a basis for educational decision-making. One aspect highlighted is the technical infrastructure, particularly the stability of the electricity supply in educational units. Although most schools are connected to the electricity grid, the quality of the energy supply is often unstable, with frequent blackouts. This instability directly impacts the data management process, particularly when operators are inputting or synchronizing data online. Such blackouts can cause system failure, loss of previously unsaved data, and even require data entry to be repeated from scratch. This situation not only increases the operator's workload but also reduces work efficiency and the

accuracy of the resulting data. Therefore, the lack of support for basic infrastructure, such as electricity, is a fundamental challenge that must be addressed immediately to ensure the DAPODIK system functions optimally in supporting the educational planning and evaluation process.

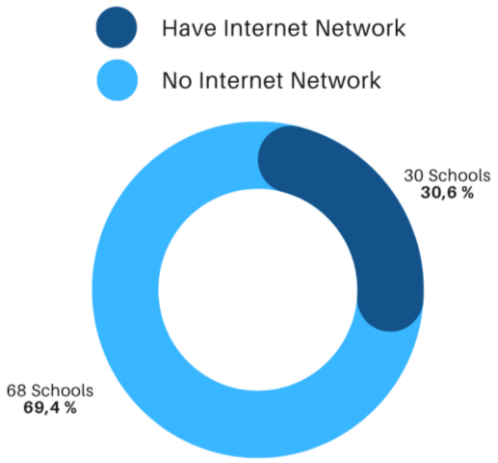

Figure 1. Elementary School Internet Availability Data

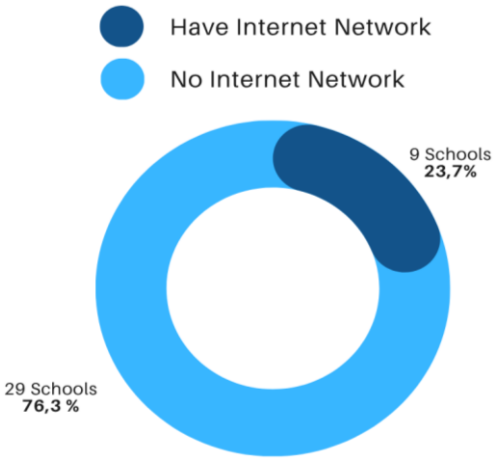

Figure 2. Internet Availability Data for Junior High School Students

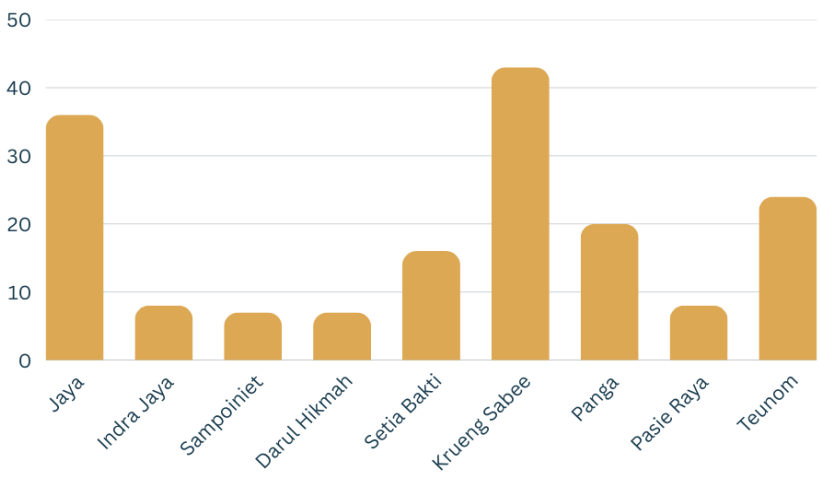

Figure 3. Computer Ownership Data on Elementary Schools per District

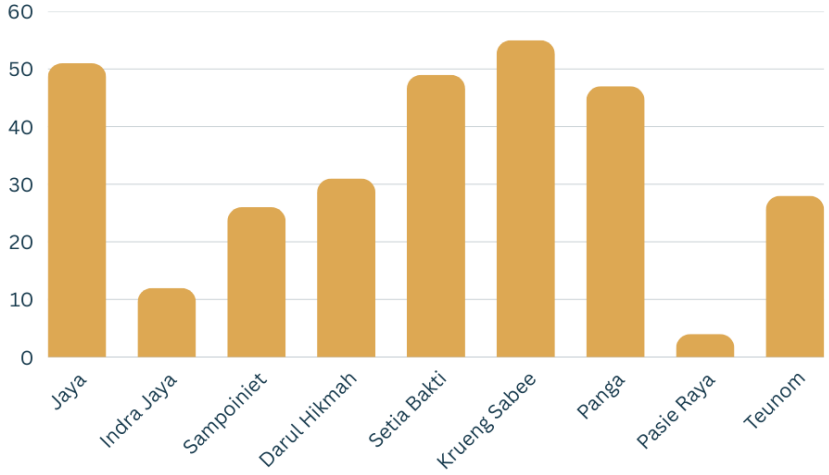

Figure 4. Computer Ownership Data at Junior High School Level per District

This study found that limited infrastructure, particularly internet access and hardware, is a significant challenge to the effective management of the Basic Education Data (DAPODIK) system in Aceh Jaya Regency. Of the 98 elementary schools (SD), 68 (69.4%) have internet access, while 30 (30.6%) do not yet have internet access. The situation is slightly better at the junior high school (SMP) level, where 29 of the 38 schools (76.3%) have internet access and 9 (23.7%) do not. Furthermore, several schools reportedly do not have computers or only use devices with low specifications that do not support optimal operation of the DAPODIK application. This disparity causes delays in data synchronization, low reporting accuracy, and an increased risk of recording errors. Thus, infrastructure issues have been shown to directly affect the quality, completeness, and timeliness of the resulting education data.

The limited digital infrastructure in schools in rural and remote areas not only affects the technical data input process but also the overall effectiveness of the national education data collection system. The presence of approximately 30 elementary schools without internet connectivity demonstrates that technological barriers delay data synchronization, despite most operators having adequate technical capabilities. Without adequate infrastructure, individual capacities cannot be optimally utilized, resulting in decreased data quality in terms of accuracy and currency. This weakness reflects the unequal distribution of data-driven education governance at the regional level. Thus, this issue is not merely technical but also reflects structural inequalities that hinder the implementation of evidence-based policy in the education sector.

In addition to network constraints, limited hardware, such as computers, is a significant impediment to DAPODIK management. Some schools lack computers, and the devices they have often have low specifications, slowing system performance. This situation forces operators to work in less-than-ideal situations, increasing their workload and increasing the potential for input errors. Consequently, the quality of the resulting data becomes unstable, affecting the accuracy of public policies such as budgeting, teacher distribution, and the construction of educational facilities. Therefore, improving educational technology infrastructure should be viewed as a strategic step toward strengthening

educational governance. This effort is not merely a technical improvement but an integral part of the national strategy to make DAPODIK an accurate, adaptive, and sustainable policy instrument to support improvements in education quality.

3.2. Structure: Policy, Commitment, Budget, Leadership, Lack of Support

The research results show that the success of providing and using education data is heavily influenced by structural factors, including policies, institutional commitment, budget adequacy, and leadership styles within educational units and related agencies. From a policy perspective, although regulations on education data collection exist, most remain normative and lack operational clarity. As a result, field implementation often relies on individual interpretation, leading to regional variation and inconsistent reporting formats and timeliness. In some regions, reporting instruments are even modified locally, thus obscuring national standards. Without clear technical guidance, data collection systems struggle to operate consistently. Therefore, more detailed, contextual, and applicable policies need to be developed so that data collection mechanisms can be implemented uniformly and accountably.

Furthermore, regarding institutional commitment, there is still a disparity between the central and regional levels in understanding the importance of data collection. Many schools view it as a mere administrative obligation, rather than a strategic instrument for educational quality planning. Strengthening commitment through coaching, training, and program integration is key to fostering a culture of sustainable data utilization.

Other factors that contribute to the effectiveness of the DAPODIK system are budget availability and leadership quality. In many schools, limited funding hinders the provision of facilities such as computers, internet connections, and data operator training. Budget allocations are often directed toward other operational needs, resulting in suboptimal data collection. However, the sustainability of the data collection system depends on adequate and ongoing financial support. The data collection budget should be viewed as a long-term investment in improving the quality of education, not simply an administrative burden.

Furthermore, leadership style has been shown to influence data management effectiveness significantly. Visionary and proactive principals or department officials can create a work culture of discipline, precision, and innovation in the use of technology. Conversely, passive leadership often results in late reporting and low staff motivation. Thus, the success of the DAPODIK system depends not only on policies and budgets but also on strong leadership that fosters synergy, accuracy, and accountability in education data governance.

Overall, this study confirms that the quality of education data provision and utilization is primarily determined by the synergy of four structural pillars: operational policies, cross-level commitment, adequate budget support, and transformative leadership. These four aspects are interrelated and inseparable. An imbalance in any one aspect will disrupt the entire system. For example, good policies without budget support will stagnate, or strong leadership will be ineffective without adequate institutional commitment. These findings make an important contribution to the academic discussion on education data governance, particularly by recognizing that system improvements cannot be achieved solely

from a technical perspective. Instead, structural, managerial, and leadership dimensions are key elements that must be addressed to ensure that education data are optimally utilized as a basis for informed, inclusive decision-making and for sustainable improvement in education quality.

Table 2. Institutional Structure Interview Findings

Aspect	Interview Findings	Effect
Policy	Regulations often change suddenly with tight deadlines, confusing schools (KS1 & KS2). Lack of integration of DAPODIK with other systems (KP & KD1).	Causes non-uniform implementation across schools/regions and inconsistent data.
Commitment	At the central level, it is considered a priority, but in schools, it is still seen as merely administrative (KP). Some teachers/operators do not yet understand the importance of a data-driven culture (KD2).	Generating suboptimal data; low commitment in schools impacts data quality.
Budget	Schools lack adequate equipment and internet access. Many operators are forced to work overtime due to limited facilities (KS1 & KS2). Operator training budgets are often limited (SD).	Input delays, low data quality, and operator fatigue.
Leadership	Proactive principals who provide facilities, moral support, and supervision result in more accurate data (KS1 & KS2). Conversely, a lack of communication and coordination leads to data errors (KD2).	Schools with weak leadership experience reporting delays and inaccurate data.

3.3. Lack of Training for Operators

Interviews with several informants served as the primary data source in this study, providing a vital first-hand perspective to understand the challenges encountered as follows:

Table 3. Interview Results Regarding Operator Quality

Informant	Statement	Findings
KP	Lack of training leads school operators to frequently make errors in data entry, resulting in poor data quality and affecting decision-making.	Lack of training leads to inaccurate data.
SD	Insufficient training makes it difficult for operators to utilize DAPODIK properly to support management policies.	The quality of the policy depends on the training of the operators.
KD1	Operators who rarely receive training tend to be less skilled, leading to more data errors and slower validation.	Minimal training yields low skills, leading to long-term Dapodik validation.
KD2	The lack of training means that many operators do not understand how to manage data, so validation still has to be done manually with limited manpower.	Lack of training makes validation work harder.
KS1	Our school operators really need regular training to manage data properly.	Need regular training to improve operator skills.
KS2	Operator performance is highly dependent on training, as without it, they have difficulty managing data properly.	Training is the key to improving operator performance.

Interviews revealed that the lack of technical training for DAPODIK operators is a crucial issue that directly impacts the quality of education data. This lack of training makes it difficult for many operators to input, validate, and manage data, leading to decreased accuracy and reliability of information. This situation also affects the quality of policies formulated at the education department level, as invalid data cannot serve as a basis for evidence-based decision-making. Furthermore, limited skills mean that the validation process is slow and often performed manually, increasing the workload for operators who also have other administrative duties. School principals identified regular, ongoing training as an urgent need to improve the capacity of the human resources involved in data management. Therefore, strengthening technical competencies through systematic training is a key prerequisite for ensuring the effectiveness and efficiency of the DAPODIK system management at the school level.

On the other hand, DAPODIK operators face challenges that are not only technical but also structural and psychological. The competency gap remains large because many operators have not kept pace with technological developments and constantly changing policies, leading to unstable data quality and validity. Furthermore, high workloads and a lack of appreciation for their contributions exacerbate the situation on the ground. In many cases, operators must double as teachers or administrative staff, often requiring data input outside of core working hours. Nevertheless, the data they manage form a crucial basis for education policies, from the distribution of BOS funds to the determination of teacher allowances. The disparity between their strategic role and the rewards they receive reflects the need for more holistic policy interventions — not just technical training, but also improvements in welfare, recognition, and incentives for operators. This support will strengthen motivation, accountability, and the quality of education data management on an ongoing basis.

3.3. Discussion

This study identified three main issues hindering the effectiveness of the DAPODIK system: infrastructure constraints, institutional weaknesses, and limited human resources. In terms of infrastructure, the most prominent obstacles include unstable internet networks, inadequate hardware specifications, and frequent power supply disruptions, particularly in the 3T (Frontier, Outermost, Disadvantaged) regions [34]. Institutionally, the lack of cross-sector policy integration, weak bureaucratic commitment, and limited operational budgets undermine the institution's ability to manage DAPODIK effectively [35]. From the human resource perspective, insufficient and irregular technical training prevents operators from keeping up with frequent system updates and regulatory changes [36]. Collectively, these interrelated issues contribute directly to the low accuracy, timeliness, and usefulness of education data collected through the system.

These findings align with previous studies that have highlighted similar challenges. Weak infrastructure and limited coordination among bureaucratic institutions remain significant barriers to the development of reliable education data systems [37]. Studies in developing countries such as Nigeria and India have shown that technological limitations, weak fiscal support, and the lack of sustained technical training produce a similar pattern of

data governance problems [38]. However, the novel contribution of this study lies in emphasizing human resource training as an institutional issue rather than merely a technical one. This perspective reveals that data quality depends not only on systems and policies but also on the competence, motivation, and accountability of the individuals responsible for data input and management.

From a capacity-building standpoint, limited access to ongoing training reflects a weak institutional commitment to improving the quality of the human resources involved in education data management. Operators who lack sufficient technical competence are at risk of producing inaccurate data, which ultimately undermines evidence-based policy formulation [39]. From a governance perspective, persistent policy misalignment, inconsistent leadership, and poor inter-sectoral coordination indicate deeper bureaucratic and cultural constraints, such as rigid hierarchical structures, sectoral ego, and limited regulatory flexibility. As noted by Rahmi et al. [40] and Mulyanti [41], successful education data management requires not only advanced technological systems but also coherent policies, adaptive leadership, and strong institutional synergy. The endurance of fragmented coordination within Indonesia's education bureaucracy shows that institutional reform must address both the structural and cultural dimensions of governance to create a sustainable and responsive digital data ecosystem.

Conceptually, this study contributes a holistic analytical framework that integrates three key dimensions —technology, institutions, and human resources — into a single, interrelated perspective on DAPODIK management. While previous research often focused on either policy or infrastructure issues [37], this study situates operator training and institutional commitment as central determinants of data reliability. By demonstrating the interdependence of these dimensions, the study enriches theoretical understanding of education data governance and offers a basis for developing a more adaptive, accountable, and learning-oriented management model.

Based on these findings, this study proposes an integrated reform framework to strengthen DAPODIK management going forward. In terms of infrastructure, the government and policymakers need to ensure stable internet connectivity, adequate hardware standards, and reliable electricity supply in all schools, particularly those in rural and 3T areas [34]. On the institutional level, policy integration across sectors must be reinforced, bureaucratic commitment strengthened, and structured budget allocations secured to sustain the data collection system [35]. Meanwhile, in the area of human resource development, technical training should be conducted regularly and progressively [39], accompanied by forums for best practice exchange and performance-based incentives to enhance motivation and accountability.

Through this integrated and coordinated approach encompassing infrastructure, institutional governance, and human resource capacity, the DAPODIK system can evolve from a purely administrative tool into a robust foundation for accurate, transparent, and evidence-based education policy-making in Indonesia.

4. CONCLUSION

This study concludes that the challenges in managing the *Data Pokok Pendidikan* (DAPODIK) system extend beyond technical limitations and encompass deeper institutional and human resource issues. The findings reveal that unequal access to digital infrastructure, weak policy coordination, limited bureaucratic commitment, and inadequate operator capacity collectively hinder the effectiveness of education data management. These problems demonstrate that reliable data governance cannot be achieved through technology enhancement alone but requires coherent institutional support and sustained investment in human capital development.

The main contribution of this study lies in developing an integrative analytical framework that links three critical dimensions —technological infrastructure, institutional structure, and human resource capacity — as interdependent factors shaping the effectiveness and sustainability of DAPODIK governance. This holistic perspective offers new insights into the complexity of education data management and underscores that effective digital education systems must balance technical innovation with institutional strengthening and workforce empowerment.

The policy implications of these findings are significant. Sustainable DAPODIK governance requires multi-level coordination among government institutions, adequate and consistent funding allocations, and continuous operator training as integral components of Indonesia's national digital education reform agenda. Strengthening these three aspects will improve data accuracy, accelerate policy responsiveness, and enhance accountability in educational management.

However, this study has limitations related to its geographic scope and the relatively small number of informants, which constrain the generalizability of the findings. The research was conducted within a limited regional context and may not fully represent the diverse conditions across Indonesia's education system.

To address these limitations, future research is recommended to: (1) conduct broader regional comparisons involving areas with different infrastructural and institutional characteristics; (2) explore the integration of DAPODIK with other national education information systems to analyze interoperability and governance efficiency; and (3) employ a longitudinal design to evaluate the long-term impact of operator training and institutional reforms on data quality and policy outcomes.

Overall, this study contributes both theoretically and practically to the field of education governance by highlighting the interconnected role of institutional capacity, technology, and human resources in achieving effective data-driven decision-making. For policymakers and practitioners, these insights offer a strategic foundation for building a more adaptive, accountable, and sustainable digital education management system in Indonesia.

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