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When Data Does Not Govern: Ecosystem Dysfunction, Punitive Culture, and Literacy Policy Failure in Tulang Bawang Regency

Ristu Irham[1]*, Noverman Duadji[2], Tina Kartika[3]
Universitas Lampung
Corresponding: Ristu Irham resturestu01234@gmail.com

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A B S T R A C T

Tulang Bawang Regency records an average student literacy score of just 1.66 against a national target of 3.00, a gap that presents an analytically important paradox: data is abundantly available through the Rapor Pendidikan and ANBK systems, yet consistently fails to function as a shared policy foundation. This study critically analyses the data pathology and education ecosystem dysfunction underlying this literacy policy failure, using a critical paradigm and a single instrumental case study design with NVivo Project Map analysis across 25 informants drawn from multiple ecosystem levels. Four findings emerge from the analysis: (1) the data blindness phenomenon, in which data exists in abundance but does not genuinely inform planning or budget decisions; (2) sectoral ego and fragmented top-down coordination that reproduces actor silos rather than cross-agency collaboration; (3) punitive data culture that drives systematic distortion and gaming the metrics at the school level; and (4) a double digital divide, geographic and demographic, that structurally excludes the most vulnerable schools from meaningful participation in the data ecosystem. These findings are interpreted through Human-Centered Development, Evidence-Based Policy, Data-Informed Decision Making, Development Governance Theory, and Ecological Systems Theory. The study concludes that the literacy crisis in Tulang Bawang does not stem from a deficit of programs or data, but from a failure of policy architecture that has not yet positioned data as a genuine navigational compass across the ecosystem.

INTRODUCTION

Literacy is not just an outcome of a subject area to be measured; it is an essential human capacity for development (Lawrence, 1992), and one that the United Nations has always viewed not as a narrow educational objective but as a fundamental human right and an instrument for sustainable development (Hanemann, 2023; UNESCO, 2024). How literacy gets framed in policy documents tends to have no clean way to account for what literacy actually does in everyday life, where the capacity to read critically, to reason about information people encounter outside school settings, and to write accurately enough to participate in formal processes, are what determine whether participation in social, economic, and democratic life is real or remains nominal. Sen (1999) argues that real human development is unable to be achieved if these essential capacities are severely limited and the effects of that constraint are not limited to educational performance. For example, employees are unable to adapt to economic change, civic involvement that over time diminishes, and a common ability to hold governmental institutions accountable that, when weakened, cannot readily be restored.

Following a certain point, it becomes less of an issue of education, compared to one of development and governance. The government's effort to address literacy in Indonesia culminated in multiple-layered responses, which include a School Literacy Movement (GLS) under the Minister of Education and Culture Regulation No. 23 of 2015, known as Kurikulum Merdeka, which sets out literacy as a core proficiency, and the ANBK, which is designed to record the conditions of literacy across every school meticulously. These efforts have not been enough to narrow the gap between specific objectives and actual outcomes. The gap becomes especially apparent in Tulang Bawang Regency, Lampung Province, where the 2023 and 2025 Regency Education Report Card recorded an average literacy score of only 1.66 among primary and junior high school students, significantly lower than the national target of 3.00 (Ministry of Education, Culture, Research, and Technology, 2023; Ministry of Primary and Secondary Education, 2025)

The low literacy conditions in Tulang Bawang are not the result of missing data or insufficient documentation of the problem. The education ecosystem in Tulang Bawang has access to various rich data sources, such as: systematically documented ANBK results, Education Reports containing achievement indicators per school, Basic Education Data (Dapodik) containing educational unit profiles, and reports from the Central Statistics Agency (BPS) documenting demographic and economic conditions. This low literacy problem does not stem from a lack of data, but from the inability to transform available data into a basis for policies capable of changing the situation.

The phenomenon occurring in Tulang Bawang is known as data blindness in this research, a condition in which policymakers have access to data, but the data is unable to serve as a basis for analyzing problems on the ground or formulating solutions (Bird, 2022; Links, 2022). The data exists as a mandatory document, not as a source of collective thinking, but without any follow-up in policy formulation.

This research aims to fill this gap, through a critical paradigm and a single instrumental case study approach, this research aims to: (1) Critically analyze the reasons why the Tulang Bawang education ecosystem fails to use data as a basis for literacy policies; (2) Identify patterns of data pathology at various levels of the ecosystem; and (3) Formulate policy implications based on a deep understanding of the problem.

Theoretically, this research contributes to broadening the understanding of the failure of evidence-based policy in the context of developing regions with unique geographic characteristics. Practically, it provides a map of the problems that can serve as a basis for more targeted policy interventions.

LITERATURE REVIEW

Human-Centered Development and Capability Approach

This research is based on the Human-Centered Development (HCD) and Capability Approach developed by Amartya Sen (1999). This approach explains that development should be evaluated not solely on economic growth or the availability of material instruments, but rather on how development can improve human capabilities in choosing and living a good life. Referring to this approach, education is an instrument for empowering capabilities, not merely the transfer of knowledge.

This capability is understood not only as the ability of students to learn and develop, but also as the ability of principals, teachers, and policymakers to make meaningful decisions. When literacy policies are not based on real-world data, the capabilities of all actors in the education system are systematically undermined. This is evident in how principals are unable to formulate appropriate policies due to a lack of sufficient information, or how teachers are unable to adjust their teaching methods because they don't know where their students are weakest. These conditions represent the result of policymaking that fails to utilize data to its full potential, not individual failure.

Evidence-Based Policy (EBP)

Evidence-based policy (EBP) provides an understanding of how the quality of public policy is determined by the quality of the evidence that underlies the formation of the policy (Davies, 1999; Nutley et al., 2007). According to EBP, a public policy must utilize data in a valid, relevant, interpretable, and available manner at the right time for decision making, so that EBP looks at data not only for its existence but also how to maximize that existence. Cairney & Toomey (2025) see the failure of a public policy as being caused by three stages, starting from the formulation of problems that are not data-based (problem framing), the selective and distorted use of data (evidence use), and the loss of learning mechanisms from evidence (policy learning).

What happened in Tulang Bawang can be identified as an illusion-based policy, where the availability of data, such as the Education Report Card as a program reference, was not utilized effectively because the underlying data was vulnerable to administrative distortion and late reporting. Within the EBP framework, public policymaking is not only based on the availability of valid data but must also be supported by an organizational culture that positions

evidence as a valuable instrument in decision-making, rather than a weapon of bureaucratic power.

Data-Informed Decision Making (DIDM)

Data-Informed Decision Making (DIDM), proposed by Mandinach & Gummer (2016) and Schildkamp (2019), emphasizes that policymaking must be based on three essential requirements: the ability to interpret data at the individual level, an organizational culture that supports constructive data use, and adequate data infrastructure. Without these three key requirements, DIDM cannot be effectively implemented, even with the availability of supporting data.

The findings of this research confirm the core proposition of DIDM: the greatest barrier to meaningful data use is not technical, but cultural. Teachers who lack the interpretive capacity to read and contextualize data will not use Rapor Pendidikan in any meaningful sense, even where access itself is not the limiting factor, because without that capacity, the platform remains a compliance visit rather than a thinking tool. Principals operating within a punitive institutional culture will not report honest data, not from any absence of mechanism, but because honest numbers carry real risk in environments where data is read as a performance verdict rather than a diagnostic input. Furthermore, administrators embedded in systems that reward compliance over learning will not develop the analytical habits that authentic DIDM requires, and will not be expected to, because the system itself creates no demand for that capacity.

These three frameworks are complemented by a variety of additional theoretical lenses that are organically integrated in the Results and Discussion sections rather than being treated as discrete analytical chapters. The study analyses the dynamic between layers of the education ecosystem using Ecological Systems Theory (Bronfenbrenner, 1979), particularly where the mesosystem breakdown between actors becomes visible in the data. The interpretive frame to understand the failure of institutional collaboration is Development Governance Theory (Hyden et al., 2004), especially in cases where fragmentation among Dinas Pendidikan, Bappeda, Kominfo, and BPKAD cannot be explained only with capacity arguments. It applies the GIGO principle at the intersection of punitive data culture and metric distortion to define the systematic decline in the quality of policy outputs at the hands of distorted inputs.

METHODOLOGY

Research Design and Paradigm

This research uses a qualitative method with a single instrumental case study approach (Creswell & Poth, 2018; Stake, 1995). The instrument is framed deliberately, in a design where a limited case is selected not only because it is unique, but also because it provides an effective lens through which to investigate a larger issue in depth. In this research, Tulang Bawang Regency plays that role, as a concentrated site where the inability of the data-based educational environment to improve literacy can be traced with the specificity that broader comparative designs might conceal. Furthermore, the study is

located within a critical paradigm, that is, a position that sees reality not as a fixed state to be measured, but as a social construction shaped by history, power relations, and accumulated systemic interests, and that directs the inquiry toward the structural circumstances that have enabled it to persist.

Location and Source Data

The research was conducted in Tulang Bawang Regency, Lampung Province, where the choice of research location was based on two main reasons, namely: First, how Tulang Bawang obtained an education score (1.66 from the national target of 3.00); Second, the unique geographical characteristics of swamp and water areas create specific challenges in efforts to digitize education.

This research source of data is based on qualitative interviews with informants selected through purposive sampling involving 25 informants from various levels of the ecosystem, comprising: 3 officials of the Tulang Bawang Regency educational service; officials of the Regional Development Planning Agency and the Tulang Bawang Regional Financial and Asset Management Agency; 6 elementary and middle school principals with variations of red-yellow-green report cards; 10 class teachers and subject teachers; 2 elementary and middle school school supervisors; 2 Digital Learning Ecosystem Community (EKOPEMBADIG) dashboard administrators; and 5 school committees and literacy communities based in Tulang Bawang.

Data Collection and Data Analysis

The data collection of this study was centred on three primary techniques, which included comprehensive semi-structured interviews with all informants, field observations at schools with varying literacy performance, and document analysis that included a Rapor Pendidikan Kabupaten Tulang Bawang 2023 and 2025, the Dinas Pendidikan work plan, and the RKAS of each school. The three sources are triangulated in a way that allows studies to move between what actors claim, what the realities of conditions on the ground have been, and the formal planning record, a triangulation that is particularly significant considering the central argument that relies on the disparity between the availability of data and its actual use in policy decisions.

The data was analysed using the Project Map technique in NVivo. This technique allows for systematic mapping of finding patterns across informants and data sources. It is feasible to identify not only recurring themes but also the structural relationships between them. Source triangulation, method triangulation, and member checking constitute three verification layers that, together, minimise the possibility that any single informant's account information or any one document alters the overall picture, guaranteeing data validity.

RESULT AND DISCUSSION

Profile of the Literacy Crisis in Tulang Bawang Regency

Tulang Bawang Regency possesses an area of approximately 3,466 km 2 and is located within Lampung Province. Tulang Bawang Regency is characterised by a majority of low-lying swamps and wetlands. It geographic

condition impacts the distribution of school infrastructure and accessibility throughout the regency. Regarding demographics, the regency has a relatively encouraging enrolment picture; the School Participation Rate (APS) for the age group of 7-12 years reached 99.43 percent, and the age group of 13-15 years was 95.73 percent, as of 2024 (BPS Tulang Bawang, 2025), whereas the Net Enrolment Rate (APM) for primary school reached 99.3 percent. Indeed, as a practical issue, a majority of primary school and lower secondary school students in Tulang Bawang attend school.

In addition, it is at this point that the data-driven literacy crisis takes an analytically interesting turn, as the problem in Tulang Bawang is not a matter of low enrolment or no students, but of what happens, or, more precisely, what fails to occur, once the students are in the classroom. High participation rates give a surface image of a working system, while the literacy results tell a very different story. The average literacy score is only 1.66 in Rapor Pendidikan Kabupaten Tulang Bawang, and the national target is 3.00 over primary and lower secondary levels. The gap is not marginal, but structural, and is effectively concealed by high enrolment figures from routine policy attention. This narrower distribution renders it even harder to dismiss this gap:

Table 1. Summary of Literacy Achievement Results for Tulang Bawang Regency, 2025

Achievement Indicator	**General Elementary School (SD Umum)**	**Equivalency Elementary School (SD Kesetaraan)**	**General Junior High School (SMP Umum)**	**Equivalency Junior High School (SMP Kesetaraan)**	**Description / Notes**
Students' Literacy Skills	Moderate	Unknown	Good	Poor	Equivalency SD was not captured by the system
Students' Numeracy Skills	Moderate	Unknown	Good	Poor	Equivalency SMP is in the red zone
Students' Character	Good	Unknown	Good	Good	Relatively stable across educational levels
Quality of Learning	Good	Unknown	Good	Moderate	Equivalency SMP is still below standard
School Safety Climate	Good	Unknown	Good	Moderate	—

Source: Tulang Bawang Regency Education Report Card, 2025.

The more refined distribution makes this gap additionally more challenging to dismiss. Table 1 captures two conditions of specific critical importance. First, equivalency education units, SD Kesetaraan and SMP

Kesetaraan, are not captured by the national data system at all. This structural invisibility is not a defect but an indication of how the data architecture was built, directed toward a formal schooling and largely blind to the students that fall outside it. Second and most urgently, SMP Kesetaraan is in the red zone for literacy and numeracy, which indicates that the most vulnerable population in terms of education in Tulang Bawang is additionally the least served by policy. This is not an unforeseen pattern, but an established societal one.

Furthermore, the literacy programs in Tulang Bawang, known as the Gerakan Literasi Sekolah (GLS) according to Permendikbud No. 23/2015, have only reached the habituation stage, which is a familiar 15-minute introductory reading activity that fulfils the administrative requirements but fails to tackle the underlying problem. Additionally, there is no meaningful scale of either the development stage requiring responding to enrichment texts or the learning stage requiring integrating literacy across subject matter. Field observations at schools in Tulang Bawang reveal the symbolic significance of existing literacy programs: they meet the procedural SOP on paper, but fail to address the critical reasoning and comprehension of reading deficits that the ANBK data continue to show year after year.

Data Blindness: When Abundant Data Produces No Policy Response

The most basic result of this study is the information blindness phenomenon that we call a systemic situation in which data is abundant but does not serve as a policy compass. The NVivo analysis shows that the theme "Data Not Used as a Policy Basis" was mentioned in 78% of the coding references by respondents, which renders it the most prominent consistent finding throughout all data sources.

However, blindness to data is not as effective as an explicit rejection of data. It works more subtly, through three interlocking mechanisms. First, data is brought in and is treated as an administrative object, a document that must exist rather than a deliberative instrument. Second, the Rapor Pendidikan is presented as an annual evaluation report, rather than a navigational tool for day-to-day policy decisions. Third, there is a significant gap between the information gathering process, conducted through ANBK and Dapodik, and the program development process, running through the Renja Disdik and school-level RKAS. These processes separately might be manageable, but together they add up to a system when data and policy planning are on completely separate tracks.

The most compelling proof of this condition comes from the Renja Dinas Pendidikan Kabupaten Tulang Bawang 2024-2025, which obviously excludes literacy improvement as an indicator of program activities. The absence is not unintentional. This means that BPKAD and Bappeda, as a budget facilitation sector, have no institutional basis to support literacy programming, although the Rapor Pendidikan information continues to indicate it as a top priority. This is, in technical terms, a failure of the evidence-driven policy cycle at the policy learning phase, a stage where the data that is readily accessible to a program should be feeding back into the program design, but instead it disappears in the administrative record with no repercussions.

Within the school level, the gap between data and policy is a different sort, but no less consequential. Document examination of RKAS files across schools reveals a troubling pattern of variation: literacy program budget allocations vary from as low as Rp100,000 to Rp8,040,000 per year, a spread that is hard to explain via any reasonable needs-driven planning reasoning, and that in either scenario falls far short of what the scale of the literacy problem reported in the Rapor Pendidikan would demand. Furthermore, many schools have no literacy improvement programme or activity at all in their RKAS, so the planning gap is not simply one of inadequate funding, but of intent. What this pattern shows us is that data blindness is not effective only at the level of the Regional Office of Education. It has trickled down to planning at the school level, where the RKAS, which should be operations transformation of academic goals into tangible activities, instead reflects either merely tokenistic budgetary lines or complete neglect. The Education Report has the data. The planning tool is included in the RKAS. But the two seldom meet in any significant way.

The official setting from the Regional Office of Education casts the approach as already based on data. One higher-up official stated that a literacy policy is meant to enhance the ability to read and understand information "through a data-based approach, particularly by using ANBK results and Rapor Pendidikan as the basis for program development" (M. Ami Iswandi Balaw, Tulang Bawang Regional Office of Education). However, what the Renja documentation and field observations reveal is that this framing is largely ambitious, since the planning tools that ought to convert the stated strategy to budget lines and program-specific metrics do not.

This statement demonstrates that the orientation toward implementing evidence-based public policy is already normatively present in official policy, but the gap between this normative orientation and practice in Tulang Bawang is at the main of the problem. As EBP emphasizes, data use should not be limited to verbal commitments but requires a valid data infrastructure, interpretative capacity at all levels of the education system, and an organizational culture capable of responding to data and implementing it in the field.

Sectoral Ego and the Collapse of Cross-Agency Coordination

The second finding of this study is the dominance of sectoral egos in the Tulang Bawang education system. NVivo results show that the theme "Sectoral Ego" dominates 42% of references in the governance dimension, while the theme "Lack of Coordination" accounts for 38%. Therefore, these two codes are interconnected and reinforce each other, forming a limited or isolated policy.

In the Tulang Bawang case, sectoral ego shows up in a number of familiar patterns. Each unit implies its own sectoral indicators and internal logic: Regional Office of Education is occupied with programs in its own domain of authority, Regional Development Planning Agency (Bappeda) moves in the logic of thematic and structural planning, Regional Office of Communication and Informatics (Kominfo) operates a digital infrastructure independently based on the educational needs, and Regional Financial and Asset Management Agency (BPKAD) allocates the budget in accordance to the

sectoral priorities that do not necessarily align with literacy expectations. The result is not an active dispute among institutions, but an increasingly damaging condition in which each institution does its work effectively in its own lane, while the interconnected problem of literacy remains untainted by any of them. The head of Bappeda Tulang Bawang captured this dynamic with unusual candor:

"Our planning has sectoral and thematic streams, and frankly, education is still treated as sectoral... so it comes down to structure, because not everything gets covered. So, if a collaboration could be formed, where exactly would the locus be in relation to education?" (Head of Bappeda Tulang Bawang).

This statement carries further analytical weight than might seem at first. This is not a complaint about resources or capacity but a confession about how the planning architecture is structured. In the logic of Indonesian regional planning, thematic programs attract structured cross-agency support, as most clearly demonstrated in the stunting reduction program, where Bappeda, Dinas Kesehatan, BPKAD, and various other operational departments collaborate according to a shared thematic locus. Sectoral programmes, on the other hand, are entirely reliant on the capability and objectives of a single department. As far as literacy, as the exclusive domain of Dinas Pendidikan, does not rise to the level of a thematic importance, the financial collaboration and curricular coordination that Bappeda, Kominfo, and BPKAD might provide will not be shown in any systemic way, and the question of where the collaborative locus ought to be will remain unresolved for the Bappeda head.

The second pattern is what Bronfenbrenner's framework describes as Mesosystem breakdown, which is a condition in which relationships between actors that are expected to reinforce one another are weak and sporadic (Bronfenbrenner, 1979). In the case of Tulang Bawang, data flows vertically, from schools up to the department and to the central level, as an administrative report. But it is not flowing horizontally as a way of coordination between actors who act at the same level. School supervisors are supposed to be the operations bridge that links the dinas and each school, but often lack the same data the dinas uses for planning. So, the bridge exists on paper, but possesses very little actual traffic.

Rather than compensating for this breakdown, the top-down coordination structure enhances it. The instructions flow fairly consistently from the centre downward to schools, but the feedback loop that flows in the opposite direction, which is from schools upwards to the dinas, is not nearly as effective. Additionally, there is no clear institutional mechanism for schools to identify specific problems on the ground, such as the lack of appropriate reading resources or low parental involvement with literacy programs, to convey those needs upward into the planning system. This, more in practical terms, indicates that policies designed at the district level are not always responding consistently to the needs that are being determined at the school level, and the gap between what policy makers suppose is taking place and what principals and teachers actually experience increases without both parties being inevitably cognisant of it over time.

Punitive Culture: How Data Became a Tool of Accountability Rather Than Improvement

The third finding, and arguably the most essential for the context of policy reform, is the dominance of punitive culture in the education data ecosystem. This is what this research refers to as punitive culture, a condition of being in which data is viewed as an instrument of evaluation and sanction, not as a tool of support and improvement. Schools with inadequate literacy scores do not receive extra attention or intensive assistance; rather, they experience administrative pressure, pointed enquiries from upper management, and, in some cases, negative implications for the school principal's career trajectory. That is, the data is used as evidence toward the school, not as a standard diagnostic instrument to resolve the issue.

The consequences of such a culture are predictable when we implement the garbage in, garbage out (GIGO) principle (Campbell, 1979; Kilkenny & Robinson, 2018): when schools are punished for poor data, then they are rationally compelled to provide data that is not entirely exact. This is what the research calls gaming the metrics, a situation where actors alter reported indicators to hit administrative targets, rather than to reflect what is actually happening in reality (Campbell, 1979; Kilkenny & Robinson, 2018).

As the Tulang Bawang data shows, this behaviour is not an issue of personal morality or systemic incompetence, but an adaptive reaction to a system that has incorporated inappropriate incentives into its data systems. The issue is not caused by dishonest people, but rather by an architecture that makes lying reasonable and honesty expensive.

Table 2. A Comparative Analysis of Punitive versus Supportive Policy Cultures within the Educational Ecosystem

Dimension	**Punitive Culture (Current *Status Quo*)**	**Supportive Culture (Recommended Framework)**
Role of Data	Used for surveillance and performance evaluation; poor metrics trigger institutional sanctions.	Used for diagnostic purposes and continuous improvement, poor metrics serve as indicators for targeted support.
Response to Underperformance	Issued warnings, systemic pressure, and negative career implications for school principals.	Intensive coaching, prioritized resource allocation, and professional mentoring.
Incentivized Behaviors	Data manipulation, fraudulent reporting, and gaming the system.	Data integrity, transparent problem-sharing, and proactive problem-solving.
Data Quality	Garbage In, Garbage Out (GIGO): Invalid data leading to a distorted organizational reality.	Valid, representative data that provides an accurate foundation for policy-making.
Policy Outcomes	Misaligned interventions that ultimately exacerbate existing systemic issues.	Precision-targeted interventions that address and resolve root issues systemically.
Leadership Model	Bureaucratic, hierarchical,	Distributed, collaborative, and

	and compliance-driven control.	problem-solving-oriented leadership.

Source: Adapted from Nutley, Walter, & Davies (2007) and field interview data, 2026.

This punitive culture works in layers. At the service level, performance indicators that focus on administrative compliance, such as how complete the data is reported, are more dominant than quality indicators, especially how the data is reported accurately and validly. At the school level, principals who report a problem often face the risk of being seen as underperforming, while those who hide a problem are relatively safe. At the teacher level, the administrative burden of reporting data is often considered a surveillance burden rather than a professional tool.

Infrastructure Pathology and the Double Digital Divide Across Schools

This research finds the double digital divide as the fourth dimension of data ecosystem dysfunction, where gaps in connectivity are functioning in parallel across two reinforcing dimensions of geographic and demographic, each adding to the other in ways making data-driven policy implementation structurally difficult to realise.

The geographical division is based on the physical characteristics of Tulang Bawang Regency itself. The region is a territory characterised by low-lying swampland and water bodies. The construction of telecommunications infrastructure, especially Base Transceiver Station (BTS) towers, faces technical and economic challenges that are far greater than in highland or urban regencies. The outcome is a severely unequal distribution of internet connectivity: some subdistricts had relatively stable connections, while swamp and waterway areas experience persistent blank spots that not much of the administrative target-setting has managed to address. The principal of SMPN 3 Banjar Agung directly described the condition as:

"Internet signal. In this Banjar Agung area, the signal comes and goes. It really gets in the way when operators need to upload data or teachers want to access the PMM dashboard." (Nining, Principal of SMPN 3 Banjar Agung).

The expressions "comes and goes" deserve a break, for they represent more than a connectivity issue. It encapsulates, with an acceptable level of accuracy, the larger state of data-driven literacy policy in Tulang Bawang: there at some times, absent at others, and not reliably available when those who are closest to the problem most need it. When infrastructure is unreliable, data cannot be uploaded in time, dashboards cannot be accessed, and the policy feedback that should be reaching teachers and principals fails to reach the system. What exactly is happening here is not a root cause, but an active process through which the phenomenon of data blindness spreads at the school level.

That demographic divide operates in terms of human resources capacity. In a lot of schools in Tulang Bawang, the teaching staff consists mainly of senior educators who are quite resistant to implementing digital technology, and younger teachers, who are more likely to be technologically adept and

comfortable with education dashboards, represent a smaller share of the composition, particularly in the schools in which the literacy problem is direst. One teacher at one of the visited schools put the generational gap quite simply:

"Some are quick to accept change, some are slow. Younger teachers adapt fast, especially with digitalization, but the senior ones, and the majority here are senior, are quite slow." (Monalisa Tri Astuti, Teacher)

The combination of geographic and demographic divides produces two mutually reinforcing layers of inequality within the education data ecosystem, and the interaction between them is where the structural problem becomes most visible. The schools that most need data-based support, those in remote localities with poor infrastructure and senior-dominated teaching staff, are also the schools that the existing system finds challenging to reach. This is an exact representation of what Bronfenbrenner's ecosystem principle would suggest: a failure of infrastructure in the Mesosystem, which includes the regency's telecommunications network, constrains capability in the Microsystem, which includes the teachers and schools that depend on it (Bronfenbrenner, 1979). Over time, this constraint does slow down the implementation of data-driven policy, and it fundamentally creates a gap among schools that can participate in the data ecosystem and those that effectively cannot.

What "Green" and "Red" Schools Actually Look Like: Ecosystem Characteristics in Contrast

One of the findings with the most instantaneous policy implications is the comparison between the schools with relatively stronger literacy scores, the green zone in the Rapor Pendidikan, and those still grappling with low scores, the red zone. This comparison allows us to find actual ecosystem factors that differentiate between the two groups.

Schools in Green Zones tend to share several consistent characteristics of their ecosystem, even where their physical resources are not identical. These include: active, data-oriented school leadership in which principals frequently review the Rapor Pendidikan and communicate findings to teachers; consistent involvement with learning communities (Kombel) that handle data as substance for discussion rather than as a compliance document; and parental support that is present, even if limited in capacity. In contrast, red zone schools frequently encounter a complicated combination of constraints on physical and digital infrastructure, resistance to the digital between senior-dominated teaching staff, weak communication bridges between school and family, and administrative responsibilities so heavy as to leave little space for professional development.

However, the more analytically significant finding is that limited resources alone do not determine the zone in which a school is situated. Additionally, there are many green zone schools that run on limited resources. What distinguishes them is not what they possess but how the leadership uses the resources that are available. The point of view is an explicit policy recommendation that efforts focused only on hardware procurement or digital infrastructure will not be sufficient unless they are supported by investment in data-based leadership capacity at the principal level. In Human-Centered Development terms, principals need to possess not only access to data as a

requirement, but the capacity to utilize that data as the basis for important choices as a function.

Proposition Matrix and Cross-Case Comparison of Findings

The four main findings can be mapped systematically against a comparative theoretical matrix, showing how each framework is either affirmed, extended, or contextualized by the empirical evidence this research produces. Table 2 presents this mapping in full, but three patterns in the matrix are worth flagging before the detailed comparison that follows.

Table 3. Theoretical Synthesis Matrix: Core Propositions, Empirical Findings, and Policy Relevance

Theory / Concept	**Core Proposition**	**Empirical Findings (Tulang Bawang Case Study)**	**Policy Implications**
Human-Centered Development / Capability Approach *(Sen, 1999)*	Development must expand tangible human capabilities rather than merely providing material instruments.	Chromebooks are available but underutilized; school principals lack the requisite capabilities to translate data into actionable decisions.	Technology investments must be coupled with holistic human capacity building (hardware + capability integration).
Evidence-Based Policy *(Davies, 1999; Nutley et al., 2007)*	Effective policy must be grounded in valid, relevant, and interpretable empirical evidence.	Educational policy-making in Tulang Bawang risks becoming an 'illusory policy' due to foundational data being highly susceptible to distortion and time delays.	Data validity and accessibility are absolute prerequisites for EBP; without them, the entire policy cycle loses its epistemological foundation.
Data-Informed Decision Making *(Schildkamp, 2019)*	DIDM requires robust interpretive capacity, a supportive institutional culture, and adequate data infrastructure.	The primary barriers to DIDM are cultural (a pervasive punitive culture) and capacity-based (low data literacy), rather than purely technical.	Interventions for DIDM must address organizational culture dimensions; merely supplying technological systems is insufficient.
Development Governance Theory *(Hyden et al., 2004)*	The quality of development is determined by institutional capacity to manage resources accountably and responsively.	Educational data governance in Tulang Bawang remains weak, characterized by sector-specific silos, a lack of systemic coordination, and institutionalized data accountability.	Data accountability must be established as a new paradigm of governance, shifting beyond mere financial audits toward information-quality audits.

Theory / Concept	Core Proposition	Empirical Findings (Tulang Bawang Case Study)	Policy Implications
Ecological Systems Theory *(Bronfenbrenner, 1979)*	Individual development is shaped by multi-layered interactions across micro, meso, exo, and macro systems.	Structural dysfunction is most prominent at the Mesosystem level: inter-actor relationships are weak, data fails to flow laterally, and the ecosystem remains fragmented.	Policy interventions must be multi-level, strengthening connectivity across ecosystemic layers rather than focusing on isolated nodes.
GIGO Principle	The output quality of an analytics system depends entirely on the quality of the data inputted.	Administrative pressure and a punitive culture drive data distortion at the input stage, resulting in misleading analytics and misaligned policy targeting.	Cultivating data integrity is the most fundamental investment required in an evidence-based policy system.

Source: Synthesized from the theoretical framework and field analysis data, 2026.

The matrix reveals that all theoretical frameworks are directly and specifically pertinent to the dimensions of dysfunction that are identified in the field, and that the relationship between theory and evidence is bidirectional, meaning that the frameworks illuminate the findings, and the findings push away in opposition to the frameworks in ways that matter for how the problem is understood. In addition to that, the findings as a whole illustrate that the literacy crisis in Tulang Bawang is not an isolated issue that can be addressed with a particular intervention, but it is a result of systemic failure across multiple ecosystem levels at once.

From this synthesis the research indicates two remediation pathways that need to operate concurrently and actively support one another. The first is infrastructure and connectivity remediation: making sure all educational units, including the swamp and waterway areas that are the hardest to reach, having access to reliable internet connectivity, since without that baseline the data ecosystem is participatory in name only. The second is data culture remediation: establishing an organisational ecosystem where data is regarded as a tool for support and collective reflection rather than an instrument of evaluation. It requires thoughtful reconstruction of the incentive structures that make misreporting rational and honest reporting costly.

Policy Implications for Data-Driven Governance in Tulang Bawang

Drawing from the findings and the theoretical synthesis, this research organises its policy recommendations into a multi-dimensional, phased matrix that addresses the dysfunction not at a single point in the ecosystem but across

the institutional, infrastructural, and cultural layers where the failure has been shown to operate simultaneously.

Table 4. Policy Recommendation Matrix Based on Data Pathology Findings in Tulang Bawang Regency

Problem Dimension	**Root Cause**	**Policy Recommendation**	**Theoretical Foundation**
Connectivity Infrastructure	Unequal distribution of telecommunication towers (BTS) and internet networks in wetlands and waterfront areas, causing severe data latency and distortion.	Implement a telecommunications infrastructure equalization program based on geospatial school mapping; prioritize "blank-spot" regions in cross-sectoral regional budget (APBD) planning.	Development Governance; Ecological Systems Theory; HCD
Organizational Data Culture	A punitive culture transforms data into an instrument for sanctions, incentivizing metrics-gaming and superficial compliance.	Reform data culture through data-driven Professional Learning Communities (PLCs); shift the operational paradigm from *data-for-punishment* to *data-for-improvement*.	DIDM; Theory of Change; Distributed Leadership
Digital Human Resources Capacity	Senior teachers and administrative support staff possess limited digital and data literacy.	Establish tiered and sustainable data literacy training programs; introduce digital competency certification for school data operators and librarians.	Human Capital Theory; DIDM; EBP
Data Validity & Accountability	Absence of adequate field verification mechanisms; inputted data frequently fails to reflect actual field realities.	Establish periodic data audit systems involving school supervisors; develop cross-source verification protocols (data triangulation).	EBP; Development Governance; GIGO Principle
Marginal Data Inclusivity	Non-formal/equivalency education units (*satuan pendidikan kesetaraan*) and schools in remote areas are underrepresented in data systems, rendering highly vulnerable groups policy-invisible.	Develop specialized data protocols tailored for non-formal and equivalency education units; ensure no educational institution remains structurally or policy-invisible.	HCD; Social Change Theory; Educational Ecosystem Theory
Cross-Sectoral Coordination	Literacy is treated strictly as a sectoral	Integrate literacy into regional annual work	Development Governance;

Problem Dimension	Root Cause	Policy Recommendation	Theoretical Foundation
	issue isolated within the Department of Education (*Dinas Pendidikan*), rather than as a cross-departmental thematic priority.	plan (RKPD) thematic planning; establish a formal coordination forum across local government agencies (Education, Planning, ICT, and Finance) backed by clear accountability mechanisms.	Distributed Leadership

Source: Synthesized from field analysis data and theoretical frameworks, 2026.

CONCLUSION AND RECOMMENDATION

This research critically analysed the education ecosystem deficiencies underlying the failure of literacy policy in Tulang Bawang Regency using a single instrumental case study approach with a critical paradigm and NVivo Project Map analysis. Four interrelated pathological dimensions were identified. First, the phenomenon of data blindness indicates that the availability of data does not automatically produce evidence-based policy, because there is no systemic mechanism that guarantees the findings of Rapor Pendidikan and ANBK to be included in the planning and budget allocation cycle. Second, sectoral ego and fragmentation of top-down coordination result in a breakdown of the Mesosystem in Bronfenbrenner's terms where data flows vertically as administrative reporting rather than horizontally as a coordination instrument, leaving the ecosystem functioning as a collection of separate silos . Third, punitive data culture leads to systematic distortion and gaming of the metrics. When the GIGO principle applies fully, policies based on distorted data lead to misdirected interventions that perpetuate the low literacy cycle. Fourth, the double digital divide, geographic and demographic, structurally excludes from meaningful participation in the data ecosystem those schools that need data-based support the most.

In theoretical terms, this research contributes to demonstrating that evidence-based policy failure in developing regional contexts cannot be reduced to data availability or access to technology, but is rooted in the complex interplay of structural, cultural and capacitive dimensions. In practice, two remediation pathways must run concurrently: connectivity infrastructure as the technical foundation and data culture reform as the values foundation. Both are non-negotiable preconditions for an authentic, inclusive and sustainable data-driven education ecosystem in Tulang Bawang Regency in a Theory of Change framework.

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