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Research Article

Implementation of Data-Based Regional Development Planning and Public Participation in The Regional Development Planning Agency (Bappeda) of Sidoarjo Regency

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Abstract: This research investigates the execution of data-informed and inclusive regional development planning within the Regional Development Planning Agency (Bappeda) of Sidoarjo Regency, concentrating on four analytical aspects: data integration and management abilities, the efficiency of participatory processes, technical and institutional obstacles concerning interoperability, and capacity-building strategies for facilitators tasked with translating public aspirations into planning priorities. The study is positioned within the national framework to establish evidence-based and participatory planning in reaction to the growing complexity regional development. Despite Bappeda Sidoarjo implementing multiple data platforms and participatory channels such Musrenbang forums, online submission systems, and sector-specific information systems the results indicate that issues like data fragmentation, insufficient digital literacy, and ineffective follow-up mechanisms continue to impede planning effectiveness. Employing qualitative methodology that includes in-depth interviews, observation, and document review, the research reveals that data integration has not reached single source of truth because of the lack of a cohesive data architecture and compatible standards among government entities. Participatory methods have increased inclusivity, but the quality of proposals and verification processes is still variable, hindering the incorporation of grassroots feedback into planning priorities. Moreover, the ability of facilitators the subdistrict and village levels is crucial in determining the quality of the compiled proposals. The research ends by highlighting the importance of improved data governance, increased actor capability, revised participatory processes, and clear follow-up mechanisms. Suggestions encompass constructing a unified data framework, offering ongoing technical training, standardizing digital Musrenbang processes, and establishing publicly available proposal-tracking system integrated within the yearly planning cycle.

Keywords: Development Planning, Implementation, Integrated Data, Musrenbang Processes , Public Participation.

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1. Introduction

Current regional development management focuses on data-based planning and public involvement in response to the complexities of development that require accountability, efficient resource allocation, and social legitimacy (Alisjahbana & Murniningtyas, 2018); The national agenda encourages the use of integrated data, the digitalization of planning processes, and the strengthening of participatory mechanisms such as the Development Planning Consultation (Musrenbang) and public consultation forums to ensure that regional policies

are responsive to the real needs of the community. This transformation aligns with the One Data Indonesia initiative and efforts to increase bureaucratic capacity in using data for evidence-based policymaking. Therefore, the preparation of regional government work plans is now expected to rely not only on intuition or previous practices but also be guided by standardized data and a substantial public dialogue process (Adinegoro et al., 2025; Maulidya & Rozikin, 2022).

At the district level, the Regional Development Planning Agency (Bappeda) functions as a manager of planning data integration and a facilitator of public participation. In Sidoarjo Regency, planning modernization efforts are evident in the digitalization of planning documents, the publication of priority data through an open portal, and the coordination of Musrenbang (Regional Development Planning Forum) regularly facilitated by Bappeda. However, official documentation and operational practices indicate gaps between policy objectives and technical implementation, for example, the need to synchronize spatial data, the basis for proposed Regional Work Plans (RKPD), and financial data to ensure better integration of planning and effective implementation by relevant regional government agencies (OPD). The availability of publicly released priority datasets is a welcome step, but the quality and interoperability of data across systems still need to be improved for optimal use.

Problems that frequently arise in the implementation of data-based planning and public participation include: (1) fragmented data and low interoperability between systems, making cross-sectoral analysis difficult; (2) the quality of public participation is often symbolic—public input does not always change technical priorities; (3) the uneven institutional and technical capacity of Bappeda and partner OPDs to develop and use evidence-based planning; and (4) limited funding mechanisms that hinder the realization of proposals resulting from participation. In Sidoarjo, studies and implementation reports revealed operational challenges such as asset/management data entry that is still focused on certain units, as well as the need to increase the capacity of facilitators so that the Musrenbang process produces proposals that are within budget.

Research from Ismubandono et al. (2019), Permana et al. (2024), and Fahlevvi (2025) provides insights that form the basis: analysis of data-driven policymaking in local government emphasizes key elements such as data quality, information technology infrastructure, and decision-maker motivation; evaluation of the implementation of the Regional Asset Management Information System (SIM-BMD) in several regions, including Sidoarjo, demonstrates the system's role in asset transparency, but also reveals the need for regular updates and interoperability; in addition, research on the effectiveness of Musrenbang emphasizes that public participation will be more valuable if facilitated by competent actors and supported by a clear follow-up process. The synthesis of these findings suggests that technical solutions (interoperable systems) need to be supported by organizational interventions (capacity building and follow-up mechanisms) so that data-driven planning and public participation significantly improve the quality of development outcomes.

Based on the conditions and previous studies, this paper focuses on four main aspects: (1) assessment of the capability of the Sidoarjo Bappeda in managing and integrating planning data to support evidence-based decisions; (2) the quality and effectiveness of public participation mechanisms (Musrenbang and digital channels) in influencing planning priorities; (3) technical and institutional barriers related to data interoperability and recommendations for data architecture that supports a single source of truth; and (4) a model for strengthening

the capacity of facilitators and follow-up mechanisms so that participatory proposals can be transformed into priority programs that are feasible to be funded and implemented. The objectives of this study are to map implementation gaps, identify inhibiting and enabling factors, and develop practical policy recommendations that can be implemented to strengthen data integration and public participation in the regional planning process in Sidoarjo Regency.

2. Theoritical Review

Regional development planning practices have undergone significant changes toward a data-driven approach to improve the accuracy of problem analysis, program effectiveness, and public spending targeting. Advances in government digitalization are encouraging regions to incorporate big data, open data, and development information systems into short- and medium-term planning (Hossin et al., 2023). Previous research has shown that utilizing integrated data not only reduces reliance on subjective assumptions but also accelerates the process of harmonization between sectors, particularly in the preparation of the Regional Work Plan (RKPD) and the initial draft of the Regional Medium-Term Development Plan (RPJMD). In Indonesia, the research was conducted by Isma et al. (2025) and Wahyu et al. (2024) Studies have shown that data quality is a key factor in policy success, as outdated or inconsistent data across regional agencies often leads to overlapping programs and budget inefficiencies.

In the context of community engagement, recent research indicates a shift from symbolic participation to a technology-based, deliberative participation model. Various regions have begun using e-musrenbang, online consultation forums, and community aspiration platforms to increase inclusivity. Research by Umayasari & Amantha (2025) indicates that effective public participation occurs when the government creates two-way communication channels, explains important information that the public needs to understand, and ensures transparency in follow-up. However, Widiasanti et al. (2025) highlighted that limited digital literacy and unequal access remain major barriers to public participation in development decision-making processes in various regions.

Studies on the implementation of regional development planning also emphasize the importance of institutional capacity and internal coordination within the Regional Development Planning Agency (Bappeda). Various research findings indicate that the success of data integration between regional government agencies (OPD) is heavily influenced by operational standards, the quality of human resources for planners, and managerial skills in combining sectoral data into a single development database. Globally, digital transformation will not achieve optimal results due to the lack of a standard data architecture, poor application interoperability, and a lack of technical training for planning officials (Alghamdi, 2024; Atieh et al., 2025). The study notes that the role of Bappeda as the primary institution in planning regulation remains challenged when sectoral OPDs have differing interpretations of development priorities.

At the local level, relevant studies indicate that areas with high socio-economic dynamics require a more adaptive, evidence-based, and participatory planning approach. The case study was conducted in urban areas of East Jawa (Mahardhani et al., 2021; Wahyono & Wahdah, 2018) This study demonstrates that the quality of public policymaking is significantly influenced by the depth of data analysis on poverty, education, health, the environment, and

spatial planning. This research is essential for understanding the context of Sidoarjo as a complex industrial, trade, and service area, making the need for direct data, consistency in planning, and community involvement vital elements in avoiding gaps and inaccuracies in development programs.

Based on this study, research on the implementation of data-driven planning and public participation in Sidoarjo Regency should focus on three main issues: how the Regional Development Planning Agency (Bappeda) manages the quality and integration of development data; how public participation mechanisms are facilitated through face-to-face and digital forums; and how these two aspects influence the quality of planning documents such as the Regional Work Plan (RKPD). A literature review reveals that synchronization between data strengthening, institutional capacity, and public participation is crucial for the success of regional planning in the digital era (Mahardhani, 2023). Therefore, this study aims to evaluate existing practices at the Sidoarjo Regency Bappeda and identify supporting and inhibiting factors that influence the effectiveness of its implementation.

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3. Methods

The research method used to address this research problem is a descriptive qualitative approach. This study applies a case study design because it emphasizes the specific institutional context and planning process in Sidoarjo Regency, which has complex socio-economic dynamics. Data were collected through in-depth interviews with Bappeda structural officials, sector planners, planning application operators, representatives of relevant OPDs, as well as community leaders and musrenbang participants at the sub-district and village levels to gain perspectives on the implementation of public participation. In addition, direct observations were conducted at musrenbang forums, planning coordination meetings, and the use of digital applications such as e-planning and e-musrenbang to study the flow of data integration and the process of program adjustments between OPDs. Analysis was conducted on documentation from various official documents, such as the RPJMD (Regional Medium-Term Development Plan), RKPD (Regional Work Plan), sectoral data, musrenbang (Regional Development Planning Meeting) minutes, and development evaluation reports to assess consistency between planning documents and implementation practices. Data analysis was conducted through interactive data reduction, data presentation, and conclusion drawing techniques, as well as triangulation of sources and methods to ensure the validity of the findings (Pahleviannur et al., 2022). This method allows the research to provide a comprehensive overview of how data and community participation are applied in the regional development planning process at the Sidoarjo Regency Bappeda, as well as identifying driving factors, constraints, and opportunities for improvement in existing practices.

4. Result And Discussion

EVALUATION OF THE CAPABILITY OF *BAPPEDA* OF SIDOARJO DISTRICT IN MANAGING PLANNING DATA INTEGRATION

The research findings indicate that the Sidoarjo Regency Regional Development Planning Agency (*Bappeda*) has taken various steps to strengthen its planning database, including sectoral data inventory, the use of spatial maps, and the uploading of planning documents to an internal portal. However, the institutional capacity to consolidate cross-

regional government agencies (OPD) data into a single, integrated database remains limited. The integration process is often hampered by inconsistent data formats, differences in indicator classifications between sources, and the absence of a dedicated unit responsible for integrated data architecture. Consequently, the available data is often fragmented and unsuitable for complex policy analysis.

The theoretical discussion connects these findings to the One Data Indonesia framework and interoperability literature, which emphasizes the importance of metadata standards, data producer policies, and technical mechanisms (APIs, data warehouses) for sectoral data to function as a single source of truth for planning (Gozali et al., 2023); From this perspective, the weaknesses of the Sidoarjo Regional Development Planning Agency (*Bappeda*) are more architectural than merely technical. This requires strengthening data policies, institutional mandates, and investment in integration infrastructure to ensure reliable data for evidence-based decision-making.

In-depth analysis shows that *Bappeda's* human resource capacity in data management and analytics varies widely: some staff possess strong GIS and statistical analysis skills, but their numbers are insufficient to meet the analytical needs of all regional government agencies (OPDs); and irregular training practices are inadequate to establish functional teams capable of executing the ETL (extract-transform-load) processes, quality control, and dashboarding required by leaders for strategic decision-making. Therefore, capability development should focus on establishing a data management unit equipped with standard operating procedures (SOPs), clear job descriptions, and ongoing training programs.

From a work process perspective, field observations indicate that sectoral bureaucracies still prioritize data ownership at the OPD level, leading to resistance to proactive data sharing. This complicates data consolidation, as data producers often perceive data updating as an additional burden without clear incentives. Management approaches are needed to modify these incentives—for example, making data updating an OPD performance indicator and activating a data producer forum that routinely conducts cross-source validation.

This finding aligns with research on the implementation of the SIM-BMD program in Sidoarjo and evaluations of One Data in various regions, which show similar patterns (Kurniawan et al., 2019; Maulidya & Rozikin, 2022): Technology exists, but its effectiveness depends on data management standards and the capacity of the human resources managing it. Therefore, practical recommendations include developing a central database for planning, implementing national metadata standards, establishing a data management unit within the Regional Development Planning Agency (*Bappeda*), and establishing an analytical competency certification program for planning staff.

Consequently, improving *Bappeda's* capabilities is not only related to IT infrastructure but also involves reformulating organizational functions and allocating resources for data management. Sustainable improvements require budget commitment, support from regional heads, and monitoring mechanisms that link data quality to planning outcomes and program performance, so that investments in capabilities are effective in improving the quality of regional planning decisions.

QUALITY AND EFFECTIVENESS OF PUBLIC PARTICIPATION MECHANISMS

Monitoring of the *Musrenbang* process at various levels indicates that formal public participation mechanisms in Sidoarjo have been operating institutionally through direct forums, village/sub-district proposal submissions, and digital channels for aspirations.

However, the quality of participation varies. Much community input consists of requests for physical projects without needs analysis, while more strategic or data-driven aspirations are rare due to limited public understanding of budget management and priorities.

The discussion connects these findings to the literature on deliberative participation, which emphasizes the need for skilled facilitation, adequate initial information, and follow-up mechanisms to ensure that community expectations are not merely symbolic input. While e-*Musrenbang* and aspiration platforms improve accessibility, without local facilitation (capacity development for residents and facilitators) and proposal verification standards, the quality of input does not contribute meaningfully to changes in planning priorities. Therefore, participation mechanisms must be designed as reciprocal processes that provide contextual information to the community and channels for feedback on implementation (Ayucandra et al., 2025).

Interview analysis indicates that differences in access to technology limit the inclusiveness of digital participation: vulnerable groups and the elderly are less likely to use online channels, so participation still relies on physical attendance at the development planning meetings (*musrenbang*). Consequently, a combination of offline and online methods, along with strategies for mainstreaming digital inclusion, is necessary to ensure a more equitable and comprehensive representation of aspirations.

From an institutional perspective, the quality of participation is influenced by the facilitator's ability to manage discussions, explain budget constraints, and help communities formulate budget-appropriate proposals. Facilitators' skills in managing discussions, explaining budget constraints, and helping communities formulate budget-appropriate proposals have been shown to determine whether aspirations are acted upon. Therefore, strengthening facilitator skills is a key intervention to increase the conversion of public proposals into priority programs. Practical recommendations include the development of evidence-based participatory facilitation modules, training of trainers for sub-district facilitators, providing information materials on budget simplification for the community, implementing proposal verification using technical criteria, and developing a proposal tracking system to allow citizens to monitor the status of their proposals. These are steps that have been shown to increase the legitimacy and effectiveness of participation in other contexts.

TECHNICAL AND INSTITUTIONAL BARRIERS RELATED TO DATA INTEROPERABILITY

This research reveals key technical challenges in integrating local government information systems, including the fragmentation of digital platforms such as sectoral applications, SIMDA, SIM-BMD, and e-*Musrenbang*, which are not connected. This fragmentation is exacerbated by low adoption of metadata standards and limited Application Programming Interface (API) infrastructure, resulting in manual data integration. This practice not only causes delays in data updates but also creates inefficiencies, dependency on technicians, and inconsistencies between proposed, spatial, and financial data.

From an institutional perspective, the study shows that the lack of a formal data sharing policy and a data ownership pattern focused on Regional Apparatus Organizations (OPDs) makes it difficult to achieve technical collaboration and integration across sectors. This situation creates information silos and hinders the establishment of accountability mechanisms needed to align annual and multi-year planning. In the analysis, these obstacles are evaluated as manifestations of partial connectivity as described in the interoperability literature. Without achieving the three dimensions of technical, semantic, and organizational interoperability,

digitalization efforts cannot produce a reliable flow of information as a basis for intersectoral planning. Therefore, the architectural solution must encompass technical pillars (data warehouse, API gateway, and ETL pipeline), semantic pillars (metadata standards and indicator classification), and policy pillars (data sharing agreements and access SOPs) so that data can function as a single source of truth (Hanisch et al., 2023; Paul et al., 2024).

A cost-benefit analysis conducted by the research team in conjunction with the technical office shows that initial investment in an integrated data architecture can reduce transaction costs between regional government agencies (OPDs), increase coordination efficiency, and accelerate the decision-making cycle, particularly in the preparation of the annual Regional Work Plan (RKPD). These findings are supported by case studies in various other regions that have implemented managed data warehouses and APIs for budget and spatial modules, where such integration has been shown to accelerate the synchronization process and improve the auditability of performance and financial reports (Gozali et al., 2023). Non-technical barriers, such as concerns about data privacy and security, also emerged during the integration planning phase. Discussions with several stakeholders indicated the importance of implementing anonymization protocols, role-based access rights mechanisms, and legal protections outlined in inter-agency cooperation agreements. Furthermore, implementing a data architecture requires a change management program that includes outreach, technical training, and incentive schemes to encourage regional government agencies (OPDs) to share data consistently.

The resulting architecture recommendations include: (1) establishing a planning data warehouse that encompasses spatial, proposal, and financial layers; (2) establishing metadata standards and indicator taxonomies in accordance with the One Data Indonesia framework; (3) developing an API gateway for real-time synchronization between applications; (4) developing data sharing agreements and operational SOPs as a foundation for data governance; and (5) providing initial funding and capacity-building programs for data managers. This combination of technical and policy elements is expected to achieve a unidirectional implementation of data trust for regional development.

In addition to these recommendations, this study also emphasizes the importance of establishing a clear governance model for managing an integrated data architecture. A governance model involving a chief data officer, a data management unit, and an inter-regional government agency (OPD) steering committee is considered effective in ensuring the continuity of data integration through the development of derivative regulations, regular evaluations, and data quality assurance mechanisms. The development of a sustainable governance structure is necessary so that data integration is not merely a project, but is institutionalized within the regional planning and budgeting cycle.

FACILITATOR CAPACITY STRENGTHENING MODEL AND FOLLOW-UP MECHANISM FOR PARTICIPATORY PROPOSALS

The findings indicate that the successful conversion of participatory proposals into priority programs is strongly influenced by the skills of the facilitators (*Bappeda* and sub-district), the existence of technical verification mechanisms, and the existence of clear follow-up paths. In Sidoarjo, when facilitators had good facilitation skills and data access, the quality of proposals increased and follow-up rates were also higher, while in other areas with fewer facilitators, many public proposals were ignored or fell behind budget. The analysis links these results to capacity development theory, which emphasizes interventions at three levels (Schmidthuber et al., 2021): Individual (technical training and facilitation), organizational

(SOPs, forum secretariat units), and policy context (regulatory support and incentives). The implementation of a train-the-trainer program, a proposal development module based on technical criteria, and rapid verification tools (technical checklists, simple budget draft templates) have proven to strengthen facilitators' ability to assess the feasibility of proposals in different contexts, enabling the same model to be applied in Sidoarjo.

Intervention analysis indicates that an efficient follow-up mechanism requires a formal coordination channel between *Bappeda*, technical OPDs, and sub-districts, as well as an online tracking system that shows the status of proposals from submission, technical verification, budget prioritization, to implementation. This transparency of status increases accountability and provides a space for the public to request follow-up. Similar tracking practices in various regions have been shown to reduce the number of undelivered proposals and increase public trust. Issues include the heavy workload of facilitators without additional resources, the lack of formal incentives for regional government agencies (OPDs) to respond to external proposals, and fragmented planning schedules that complicate alignment with the budget cycle. Recommended proposals include the creation of a *Musrenbang* secretariat equipped with an operational budget, alignment of planning calendars between OPDs, and a performance incentive system for OPDs that successfully implement participatory proposals.

Experience in various regions shows that when participatory planning processes are strengthened through collaboration between actors, the quality of needs identification improves, technical validation becomes more efficient, and the potential for program duplication is minimized. Furthermore, the presence of external actors can ensure that community assistance is more consistent throughout the year, not just during the *Musrenbang* cycle, thus sustaining capacity building. Therefore, a policy architecture supporting participatory planning must clearly define collaborative roles so that the process of transforming public proposals into priority programs depends not only on the facilitator's abilities but also on the continuity of relationships between actors within the regional planning ecosystem.

The final recommendations include a package of interventions: (1) a tiered training program for facilitators and staff at sub-district levels; (2) a toolkit for technical verification and a simple draft budget template for the community; (3) an online tracking system for proposals integrated with the Regional Work Plan (RKPD); (4) the establishment of a forum secretariat with an operational budget; and (5) an incentive mechanism for implementing OPDs. This combination is expected to increase the likelihood of converting public proposals into priority programs that can be funded and implemented. In addition to these interventions, the study also emphasizes the importance of creating a sustainable collaborative ecosystem between local governments, communities, and non-governmental parties such as universities and civil society organizations. This ecosystem can serve as a collective platform for exchanging data, improving technical criteria, and enhancing community-based oversight and monitoring mechanisms.

5. Conclusion

The conclusion of this study emphasizes that the implementation of data-driven regional development planning and public participation in the Sidoarjo Regency Bappeda has shown good progress, but still faces a number of structural, technical, and institutional challenges that hinder its optimization. Capability in data management and integration has

demonstrated a baseline through the use of sectoral information systems, spatial data, and digital channels. However, data fragmentation, limited analytical human resources, and the lack of an integrated data architecture have resulted in the planning process not being fully based on evidence. Public participation mechanisms through Musrenbang (Regional Development Planning Forum) and digital channels have created opportunities for democratization in planning, but the quality of participation, disparities in digital literacy, and the lack of follow-up mechanisms have prevented public input from having a significant impact on development priorities. Technical and institutional challenges in data interoperability indicate the need for a comprehensive approach that includes harmonizing metadata standards, developing a data warehouse, integrating applications through APIs, and strengthening policies for data sharing between regional government agencies. The facilitator's ability has been proven to be a determining factor in the success of transforming public proposals into key programs, so that capacity building, provision of technical tools, and proposal monitoring systems should be a policy focus. Based on the research results, the main recommendations include: building an integrated data architecture as a single source of truth, establishing a data management unit within the Regional Development Planning Agency (Bappeda), increasing the capacity of facilitators through phased training, strengthening proposal verification and follow-up mechanisms, and implementing a transparent proposal tracking system linked to the RKPD cycle. These recommendations are expected to create a more responsive, inclusive, efficient, and evidence-based planning ecosystem to support more adaptive and sustainable regional development in Sidoarjo.

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