

Assessing Local Road Management Capacity and Implementation in Philippine Local Government Units: Evidence from District I, Southern Leyte

**Edu S. Espina, M.Eng.¹, Renato L. Maglasang, Jr., MSCE²,
Gabino C. Hilvano, PhD³, Edizon R. Domingo, MSCE⁴**

¹*Faculty, Department of Civil Engineering, Lapulapu-Cebu International College, Lapu-Lapu City, Cebu, Philippines*

²*Department Head, Department of Civil Engineering, Lapulapu-Cebu International College, Lapu-Lapu City, Cebu, Philippines*

³*Associate Professor III and Head, Department of Geodetic Engineering, Eastern Visayas State University – Main Campus, Tacloban City, Leyte, Philippines*

⁴*Faculty, Civil Engineering Department, National University Philippines, Philippines*

Email of Corresponding Author: edu.espina@lcic.edu.ph

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Abstract

This study examined the organizational composition, engineering-office capacity, implementation maturity, and associated factors influencing Local Road Management (LRM) practices among seven Local Government Units (LGUs) in District I, Southern Leyte, Philippines. Anchored in the Input–Process–Output framework and the Local Road Management Performance Assessment Manual, the study employed a quantitative descriptive–correlational research design involving 74 permanent engineering-office personnel selected through total enumeration. Data were gathered using a structured questionnaire with an established reliability coefficient of 0.914 and analyzed through descriptive statistics, chi-square tests, Phi coefficients, and Cramer's V. Results revealed that none of the participating LGUs had formally established LRM teams, while engineering personnel, technical competencies, and operational resources were unevenly distributed. Only 23 respondents were licensed civil engineers, and 10 had undergone Local Road Management Performance Assessment Tool (LRMPAT) training. Among the four management stages, project implementation exhibited the highest maturity, whereas monitoring and evaluation demonstrated substantial deficiencies in performance tracking, systematic assessment, and evidence-based decision-making. Significant associations were identified between LRM process indicators and engineering specialization, LRMPAT-related training, and active assessment-tool application, while professional licensure alone showed limited associations. The findings underscored the need to institutionalize dedicated LRM teams, strengthen specialized technical training, and establish systematic monitoring and evaluation mechanisms. The study supported Sustainable Development Goals 9, 11, and 16 through its emphasis on infrastructure management, sustainable communities, and effective local governance. Its sustainability implications centered on strengthening institutional accountability, technical capacity, and evidence-based road management to support long-term infrastructure functionality and local development.

Keywords: Engineering-Office Capacity; Engineering Specialization; Local Government Units; Local Road Management; Local Road Management Performance Assessment Tool; Monitoring and Evaluation; Sustainable Infrastructure

1. Introduction

Local road networks are essential to socioeconomic development, transportation connectivity, and access to public services (Switala, 2023). Effective road infrastructure management depends on local government capacity to plan, implement, monitor, and evaluate infrastructure projects (Switala, 2023). This study examined Local Road Management (LRM) team composition, engineering-office capacity, and implementation processes among seven Local Government Units (LGUs) in District I, Southern Leyte, focusing on the relationships between team-profile attributes and LRM process performance.

In the Philippines, approximately 190,000 kilometers of local roads fall under LGU jurisdiction, with substantial portions experiencing poor conditions and inadequate connectivity. Republic Act No. 7160, or the Local Government Code of 1991, devolved local road management responsibilities to LGUs (Republic of the Philippines, 1991). Institutional mechanisms, including the Local Road Management Performance Assessment Manual (DILG–OPDS, 2015), road management assessment tools (Government of the Philippines, 2022), and DILG–DBM Joint Memorandum Circular 2017-2 (DILG & DBM, 2017), provide guidance for strengthening local road planning, implementation, monitoring, and evaluation.

Existing literature identifies financial limitations, infrastructure deficiencies, technical capacity constraints, and project delays as challenges affecting local road management (Navarro & Latigar, 2022). These concerns emphasize the importance of engineering personnel, professional licensure, specialization, technical training, LRMPAT exposure, and equipment availability in supporting effective LRM processes. Strengthening organizational and technical capacity is therefore essential to improving infrastructure management and institutional performance (Juco et al., 2023; Sumaryana et al., 2024).

District I of Southern Leyte comprises Maasin City and the municipalities of Macrohon, Padre Burgos, Limasawa, Malitbog, Tomas Oppus, and Bontoc. The seven LGUs collectively manage approximately 321 kilometers of local roads. Concerns regarding road maintenance, construction materials, and connectivity highlight the importance of assessing engineering-office capacity and LRM implementation. Despite national road management guidelines, district-level evidence concerning LRM team composition, technical resources, and process maturity remains limited (Department of the Interior and Local Government–Cordillera Administrative Region, 2023).

The study adopted the Input–Process–Output (IPO) framework to examine organizational capacity and LRM implementation. Inputs included team composition, engineering personnel, professional licensure, specialization, training, LRMPAT exposure, equipment, and office facilities. The process involved assessing planning, implementation, monitoring, and evaluation based on the Local Road Management Performance Assessment Manual (DILG–OPDS, 2015). Using descriptive and correlational analyses, the framework supported the identification of implementation maturity, institutional capacity gaps, and capacity-building priorities.

Although previous studies examined road infrastructure investment, management challenges, and project delays (Navarro & Latigar, 2022), district-level assessments of LRM team characteristics and implementation processes remain limited. This study addressed this gap by (1) determining LRM team composition; (2) profiling LGU engineering offices according to personnel, licensure, specialization, LRMPAT training, and equipment availability; (3) evaluating implementation across planning, implementation, monitoring, and evaluation; and (4) examining relationships between LRM team-profile attributes and implementation processes. The study tested the null hypothesis that no significant relationship existed between LRM team-profile attributes and the four implementation indicators, against the alternative hypothesis that at least one team-profile attribute was significantly associated with at least one LRM process indicator.

The study aligned with SDG 9 (Industry, Innovation and Infrastructure) by examining institutional capacity for effective road infrastructure management, SDG 11 (Sustainable Cities and Communities) by addressing local connectivity and infrastructure accessibility, and SDG 16 (Peace, Justice and Strong Institutions) by emphasizing effective local governance and institutional performance. These connections highlight the relevance of strengthening LRM capacity to sustainable infrastructure and community development.

The study contributed to institutional, infrastructure, and socioeconomic sustainability by examining organizational and technical factors associated with effective road management. Assessing personnel qualifications, engineering resources, and implementation processes provided evidence for identifying capacity gaps and informing LGU capacity-building initiatives. The findings could support improved infrastructure management, long-term road functionality, transportation connectivity, and sustainable local development (Grilli & Balzi, 2023).

2. Material and methods

2.1 Research Design

A quantitative descriptive–correlational research design was employed to examine LRM team composition, engineering-office profiles, and implementation status across planning, implementation, monitoring, and evaluation. The correlational component assessed associations between LRM team-profile attributes and implementation process indicators.

2.2 Locale of the Study

The study was conducted in seven LGUs in District I, Southern Leyte, Philippines, comprising Maasin City and the municipalities of Macrohon, Padre Burgos, Limasawa, Malitbog, Tomas Oppus, and Bontoc. These LGUs served as the geographical and institutional setting for assessing local road management capacity and implementation practices.

2.3 Respondents of the Study

The respondents consisted of 74 permanent engineering-office personnel directly involved in LRM implementation. Of these, 54 respondents (73%) were from Maasin City, while 20 (27%) represented the remaining six municipalities. The concentration of respondents in Maasin City was considered when interpreting aggregated district-level findings, as its engineering-office practices could have greater representation than those of smaller municipalities.

2.4 Sample and Sampling Procedure

Total enumeration was employed to include all 74 eligible permanent engineering-office personnel involved in LRM across the seven LGUs. Casual and Job-Order personnel and non-engineering officials with peripheral LRM involvement were excluded. Municipal-level interpretations were undertaken where respondent counts permitted to account for differences in respondent distribution.

2.5 Research Instrument

A four-part structured questionnaire was used to assess LRM team composition, engineering-office profiles, implementation processes, and demographic and verification information. The instrument included four items on team composition, four on engineering-office characteristics, and approximately five primary questions per implementation stage, each containing about five sub-questions. Responses primarily used dichotomous Yes/No options, supplemented by Not Applicable and open-ended responses.

The questionnaire was pilot-tested in Sogod, Libagon, Liloan, and San Ricardo, where 10 questionnaires were distributed. Internal consistency was assessed using the Kuder–Richardson Formula 20 (KR-20), appropriate for dichotomous responses (Wong Shao Yun et al., 2023). The resulting reliability coefficient of 0.914 indicated excellent internal consistency.

2.6 Data Gathering Procedure

Written permission was obtained from the respective municipal mayors before data collection. Respondents were identified through coordination with municipal engineers and local chief executives. The data-gathering process involved identifying LRM team members, profiling engineering-office personnel and resources, securing institutional approval, distributing questionnaires, and retrieving completed instruments after one week. Responses were subsequently encoded in Microsoft Excel and verified through double-entry checking to ensure data accuracy.

2.7 Data Analysis Techniques

Descriptive statistics were employed to summarize LRM team composition, engineering-office characteristics, and implementation status. The chi-square test of independence was used to determine associations between LRM team-profile attributes and implementation process indicators (Biswal, 2024). The strength of significant associations was assessed using the Phi coefficient for two-by-two contingency tables and Cramer's V for larger contingency tables. Instrument reliability was evaluated using KR-20 to determine the internal consistency of dichotomous questionnaire responses. Since the study employed total enumeration, inferential findings were interpreted cautiously, recognizing that the reported p-values represented probabilities under a hypothetical random-sampling process.

2.8 Ethical Considerations

Institutional consent was obtained from participating LGUs through their respective municipal mayors. The purpose of the study was communicated to the participating LGUs, and respondent identities were anonymized during analysis. Individual responses were reported only in aggregate to maintain confidentiality.

3. Results and Discussion

3.1 Local Road Management Team Composition and Engineering-Office Capacity

3.1.1 Formation and Organizational Structure of LRM Teams

None of the seven LGUs had formally established or initiated the formation of an LRM team or task force during data collection, although all expressed plans to establish one. Road maintenance and construction responsibilities were handled by Municipal Engineering Offices (MEOs), while planning and feasibility activities were undertaken by Municipal Planning and Development Offices (MPDOs). The absence of formal LRM teams indicated gaps in institutional coordination despite existing management guidelines (DILG–OPDS, 2015) and supporting policies (DILG & DBM, 2017). This finding was consistent with the institutional capacity challenges identified by Lubos et al. (2023), emphasizing the need to strengthen organizational structures supporting devolved infrastructure responsibilities (Juco et al., 2023; Sumaryana et al., 2024).

3.1.2 Engineering-Office Personnel and Employment Status

The seven LGUs employed 144 engineering-office personnel, comprising 74 permanent employees (51%), 27 casual employees (19%), 42 Job-Order personnel (29%), and one Contract-of-Service employee (1%). Maasin City accounted for 84 personnel, including 54 permanent employees, while the remaining municipalities had smaller workforces. Among the 74 respondents, 49 were engineering graduates and 23 were licensed civil engineers. The uneven distribution of personnel highlighted differences in engineering-office capacity across LGUs. This pattern reflected the human-resource limitations affecting local infrastructure management discussed by Navarro and Latigar (2022). The concentration of permanent respondents in Maasin City also indicated that district-level findings were more strongly influenced by its engineering-office characteristics (Dupuis et al., 2026).

3.1.3 Engineering Specialization, Training, and Equipment Availability

Of the 23 licensed civil engineers, 22 specialized in Construction and Engineering Management, while one specialized in Structural Engineering. Only 10 respondents (14%) had attended LRMPAT-related training, and five (7%) had participated in other relevant training. Maasin City reported no LRMPAT-trained personnel despite having the largest workforce. Equipment and software resources were also concentrated in Maasin City, which had 14 vehicles or heavy equipment units and 126 office or software items, compared with 29 and 91, respectively, across the six municipalities. These findings demonstrated disparities between personnel qualifications, technical training, and resource availability. The concentration of equipment in Maasin City alongside the absence of LRMPAT-trained personnel suggested that physical resources and specialized competencies were not necessarily aligned. This highlighted the importance of coordinated capacity-building initiatives addressing both technical expertise and operational resources (Ajagu et al., 2025).

3.2 Local Road Management Implementation Maturity

3.2.1 Planning Processes and Road Project Prioritization

Planning demonstrated mixed implementation performance, with four of 13 indicators receiving majority affirmative responses. Public participation was the strongest component, with 94% of respondents reporting community involvement in identifying road needs and considering public feedback. However, only 3% reported using a documented prioritization framework based on traffic volume, social impact, and pavement conditions. The findings suggested that road planning relied heavily on community demands rather than systematic, evidence-based prioritization. Although public participation supported responsiveness to community needs, limited application of documented assessment criteria indicated weaknesses in structured infrastructure planning (Balzi & Grilli, 2023).

3.2.2 Road Project Implementation Practices

Implementation was the strongest LRM stage, with 11 of 14 indicators receiving majority affirmative responses. Competitive bidding was reported by 100% of respondents, while 96% confirmed clear contract scopes and timelines and dedicated implementation teams. Formal project handover was reported by 92%, whereas only 42% indicated the availability of functioning stakeholder grievance mechanisms. These results indicated relatively established project execution practices but weaker mechanisms for addressing stakeholder concerns. The contrast suggested that LGUs placed greater emphasis on construction and contract administration than on participatory accountability during project implementation (Department of the Interior and Local Government–National Capital Region, 2025).

3.2.3 Monitoring Systems and Road Maintenance Performance

Monitoring demonstrated substantial implementation gaps, with 11 of 12 indicators receiving majority negative responses. Only 3% reported tracking key performance indicators for road-maintenance effectiveness, while approximately 11%–15% reported standardized road-condition data collection systems or related software. Nevertheless, 91% confirmed the availability of public feedback mechanisms. The findings indicated limited institutional capacity for systematic infrastructure performance monitoring despite existing public feedback channels. These weaknesses were consistent with the road-maintenance challenges documented by the Navarro

and Latigar (2022), emphasizing the importance of structured monitoring systems for sustained infrastructure functionality (Philippine Information Agency, 2025; Jiang et al., 2022).

3.2.4 Evaluation Practices and Data-Driven Decision-Making

Evaluation was consistently weak, with all nine indicators receiving majority negative responses. Only 4% reported an established performance-evaluation framework, 17% utilized LRMPAT data during evaluations, and 11% indicated sufficient capacity to analyze complex road-management information. These results revealed limited institutional mechanisms for assessing road infrastructure outcomes and incorporating performance information into management decisions. Together with the monitoring findings, they indicated that LGUs concentrated more heavily on project implementation than on evaluating long-term infrastructure performance (Schoeman & Chakwizira, 2023).

3.2.5 Variations in LRM Implementation Across LGUs

Implementation generally demonstrated stronger performance across the seven LGUs, while evaluation remained consistently weak. Planning and monitoring exhibited greater variation among municipalities, with Malitbog showing comparatively weaker planning and monitoring performance and several other LGUs demonstrating stronger monitoring patterns. These differences suggested uneven institutional maturity across LRM stages and municipalities. The consistent weakness in evaluation indicated a district-wide capacity concern, while variations in planning and monitoring highlighted differences in local management practices.

3.3 Relationships Between LRM Team Profiles and Implementation Processes

3.3.1 Professional Licensure and LRM Implementation

Chi-square analysis showed that the presence of licensed engineers was significantly associated with only one of 14 implementation indicators and one of 12 monitoring indicators. No significant associations were identified across the 13 planning indicators or nine evaluation indicators. These findings indicated that professional licensure alone was rarely associated with stronger LRM process maturity. The results suggested that the presence of licensed personnel did not necessarily correspond to effective organizational processes without complementary technical competencies and institutional support.

3.3.2 Engineering Specialization and LRM Process Maturity

Engineering specialization demonstrated significant associations with five planning indicators, four implementation indicators, six monitoring indicators, and five evaluation indicators. Significant relationships generally exhibited strong to very strong association coefficients. The findings indicated that specialized engineering competencies were more consistently associated with LRM implementation maturity than professional licensure alone. This emphasized the relevance of technical specialization in supporting road planning, project execution, performance monitoring, and evaluation.

3.3.3 LRMPAT Training and LRM Implementation

LRMPAT-related training demonstrated significant associations with six planning indicators, two implementation indicators, three monitoring indicators, and four evaluation indicators. These relationships indicated that training participation was associated with multiple aspects of LRM process performance. The results supported the importance of targeted technical training in strengthening local road management capacity. This interpretation was consistent with the broader LGU capacity-development concerns discussed by Lubos et al. (2023) (Department of the Interior and Local Government–Cordillera Administrative Region, 2023).

3.3.4 LRMPAT Application and LRM Process Performance

Active LRMPAT application demonstrated significant associations with five planning indicators, five implementation indicators, eight monitoring indicators, and six evaluation indicators. Monitoring exhibited the highest number of significant associations. Across significant relationships, Cramer's V coefficients generally ranged from 0.30 to 0.71. These findings indicated that active use of assessment tools was consistently associated with stronger LRM process performance, particularly in monitoring and evaluation. Compared with professional licensure alone, LRMPAT application showed broader associations with implementation maturity, highlighting the importance of integrating technical assessment tools into routine management practices.

3.4 Institutional Capacity Gaps and Implications for Local Road Management

The overall findings revealed three major institutional concerns: the absence of formally established LRM teams, limited specialized training and assessment-tool utilization, and weaker monitoring and evaluation practices compared with project implementation. Despite relatively strong implementation procedures and public participation, documented prioritization, performance monitoring, and systematic evaluation remained limited. These patterns reflected the institutional capacity challenges associated with decentralized infrastructure responsibilities (Lubos et al., 2023). The findings further supported the importance of strengthening specialized technical competencies, LRMPAT-centered training, and organizational coordination. Addressing these gaps

could improve the consistency of local road management processes and support more systematic infrastructure planning, maintenance, and evaluation across District I, Southern Leyte (Grilli & Balzi, 2023; Ajagu et al., 2025).

4. Conclusion & Recommendations

The study revealed that none of the seven Local Government Units (LGUs) in District I, Southern Leyte had formally established Local Road Management (LRM) teams, with responsibilities informally handled by engineering and planning offices. Engineering-office capacity was unevenly distributed, with only 23 of 74 permanent personnel being licensed engineers and 10 having attended LRMPAT training. Most licensed engineers specialized in Construction and Engineering Management. LRM implementation demonstrated the strongest performance, while monitoring and evaluation remained weak, and planning was strongest in public participation. Significant associations were identified between LRM process maturity and engineering specialization, LRMPAT training, and active tool application, whereas professional licensure alone showed limited associations with process performance.

LGUs in District I should formally establish LRM teams with clearly defined responsibilities covering planning, implementation, monitoring, and evaluation. The Department of the Interior and Local Government and other relevant agencies should strengthen implementation monitoring and provide technical assistance, particularly to LGUs lacking LRMPAT-trained personnel. Capacity-building initiatives should prioritize LRMPAT training, data analysis, pavement-management specialization, and continuing professional development rather than relying solely on additional engineering personnel. LGUs should also formalize the responsibilities of licensed engineers in LRM processes. Further studies should expand coverage to other districts of Southern Leyte and provinces in Eastern Visayas to assess the generalizability of the findings and identify additional implementation challenges.

The study was limited to seven LGUs in District I, Southern Leyte, and included only 74 permanent engineering-office personnel involved in LRM, excluding casual, Job-Order, and non-engineering personnel. The concentration of respondents in Maasin City may have disproportionately influenced district-level findings. Furthermore, the total enumeration design limited the interpretation of inferential statistics, while the geographical scope restricted the generalizability of findings to other districts and provinces.

5. Compliance with ethical standards

The authors acknowledge the participation of permanent engineering-office personnel from the seven Local Government Units (LGUs) in District I, Southern Leyte, and the cooperation of the respective municipal mayors and local government authorities. Institutional consent was obtained before data collection through non-invasive survey questionnaires. Confidentiality was maintained by anonymizing respondent identities and reporting findings in aggregate without disclosing personally identifiable information. Voluntary participation, individual informed consent, the absence of conflicts of interest, and external funding status require verification by the authors before publication.

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