Decision Support System for Strengthening District Administration in India

ABSTRACT

District administration in India plays an important role in delivering public services, enforcing law and order, implementing government schemes, and responding to local issues. District Magistrates, as the administrative heads, handles a wide range of responsibilities while facing fragmented workflows, outdated data systems, and increasing coordination demands. Despite multiple digital initiatives, most existing tools are not even capable of effectively supporting routine administrative tasks, and they do not assist in making strategic or data-driven decisions. To understand the current situation, this thesis investigates the key challenges faced in district administration and addresses them using a targeted approach supported by appropriate research methods. It further designs and evaluates a modular Decision Support System (DSS) specifically developed to overcome these limitations and enhance quality of the governance processes at the district level in India.

The research begins by mapping the current administrative ecosystem through a detailed field investigation comprising interviews, visits, and Focus Group Discussions (FGDs) with Indian Administrative Service (IAS) officers and other district officers. These consultations provide a detailed understanding of governance challenges, including weak institutional memory, duplicated efforts across departments, lack of monitoring dashboards, delays in compliance reporting, and limited use of analytics in day-to-day administration. This diagnostic phase lays the groundwork for developing a problem-driven technological solution.

To address the identified gaps, the thesis proposes a modular DSS designed using the SAP-LAP (Situation-Actor-Process-Learning-Action-Performance) framework. The DSS comprises four modules, each tailored to a specific administrative function: (i) Meeting Management, (ii) Compliance Tracking, (iii) Law and Order Monitoring, and (iv) Writ Petition Management. These modules are not generic software solutions, but rather problem-specific tools co-designed with field officers to ensure relevance, usability, and operational fit. For instance, the Meeting Management module automates the generation of agenda items, records action points, assigns tasks, and tracks follow-ups. The Compliance Module ensures structured tracking of official orders, deadlines, and reminders. The Law-and-Order module integrates incident reporting, risk flagging, and lessons learned, while the Writ Petition module supports legal preparedness through document tagging and timeline alerts.

Following the system design, the study undertakes a rigorous assessment of barriers to DSS adoption using a Multi-Criteria Decision-Making (MCDM) approach. In the first stage, the Fuzzy Best-Worst Method (FBWM) is employed to determine the relative importance of 18 identified barriers, categorized under four classifications. FBWM is chosen for its ability to capture uncertainty and expert judgment more consistently than traditional pairwise methods. Results reveal that 'Limited IT Capabilities', 'Resistance to Change, 'Data Quality issues', and 'Skill Gap and Technology Illiteracy' rank among the top barriers. In the second stage, the Decision-Making Trial and Evaluation Laboratory (DEMATEL) technique is used to identify causal relationships among barriers. This analysis classifies barriers into 'cause' and 'effect' groups and maps how to resolve root causes can help mitigate downstream effects. This integrated FBWM-DEMATEL methodology enables a targeted, evidence-based roadmap for policy intervention.

Recognizing the transformative potential of Generative Artificial Intelligence (GenAI) in public governance, the thesis also explores the adoption of GenAI within district administration. While GenAI applications in other areas have gained traction globally, their integration at the administration level remains limited due to infrastructures constraints and ethical concerns. This study extends the Technology-Organization-Environment (TOE), FBWM-DEMATEL framework to evaluate adoption challenges related to GenAI, such as Model training, Unreliable Output, and Biased Decisions. Based on expert validation, the thesis identifies priority areas where GenAI can complement the DSS and help in district administration, namely, in law-and-order forecasting, chatbot-based citizen query resolution, automated document summarization, and decision alerts.

The final part of the research presents a practical implementation framework, grounded in institutional theory and designed for operational feasibility. A RACI matrix (Responsible-Accountable-Consulted-Informed) is developed to clearly define the roles and responsibilities of stakeholders involved in the deployment of the DSS and related capacity-building efforts. Each module is aligned with specific departmental functions to ensure clarity, ownership, and accountability. To evaluate the impact of the DSS, a study conducted using numerical analysis to evaluate performance. Findings from analysis indicate that the DSS can reduce the routine administrative workload by approximately 12.55 hours per week, increase compliance efficiency by over 30%, and enable quicker legal and policy responses. Additionally, the system

enhances inter-departmental coordination and improves institutional memory addressing persistent challenges in district-level governance.

From a theoretical perspective, this thesis makes three key contributions. First, it extends the SAP-LAP framework to DSS design in district administration, offering a structured way to incorporate field realities into system development. Second, it integrates FBWM and DEMATEL to simultaneously prioritize and analyze the interrelationships among adoption barriers, addressing a critical methodological gap in e-governance research. Third, it applies an implementation approach that combines RACI mapping with a capacity building framework, thereby enhancing the planning and accountability of public technology projects.

This study demonstrates how decision science and technology design can be integrated to address the evolving needs of district governance in India. By embedding decision frameworks, accountability frameworks, and capacity-building mechanisms, the research presents a scalable and context-specific model for governance transformation. The findings offer valuable insights for policymakers, administrative training institutes, digital governance practitioners, and international organizations working to enhance state capacity in developing countries.

Keywords: Decision Support System, District Administration, Digital Transformation, Governance Innovation, SAP-LAP Framework, FBWM, DEMATEL, Generative Artificial Intelligence