Three-Tiered Data & Information Integration Framework for Highway Project Decision-Makings

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ABSTRACT
The advancement in digital data storage technology and devices, better database management systems and data warehouse technology has allowed State DOTs to collect, store and manage large amount of highway project data. These data range from surveying data during the planning phase to pavement condition data during the operation and maintenance phase. However, there is a huge concern if whether the data currently being collected provides the right information needed for decision-making. There are questions if these data and information are meaningful and interpreted in the same manner, or if they reflect the details of the original observation, or if they are recorded in consistent manner or include all the relevant and necessary data to support highway decision-makings. This study discusses the current level of use of collected data by State DOTs and develops an innovative data and information integration framework which can ultimately support various decisions over the life cycle of highway projects. The study uses two highway projects from Iowa DOT and Oklahoma DOT as case studies to identify the needs of various decision makers and current level of data collection and management effort in terms of data types, formats and availability across the life cycle of highway projects. The study develops

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a gap analysis between currently available information and ideally required information for different types of decisions. The framework presents an active utilization plan of currently existing databases. The framework will help develop a new data collection and information/knowledge generation plan to support key decisions which historically were not well supported with information and data. In addition, it will allow DOT engineers understand the purpose of collecting specific data, how the data can be transformed into information and knowledge, and what types of decisions will benefit from the generated information and knowledge which in turn justifies the continuous and growing data collection efforts of State DOTs.

**Key Words:** data collection, data integration, highway project, decision-making