Michigan Department of Transportation
RESEARCH Administration

RESEARCH SPOTLIGHT

Project Information

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COST SHARING: 20% MDOT, 80% FHWA through the SPR, Part II, Program

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Michigan-specific construction cost index improves highway project planning

A highway construction cost index (HCCI) provides information about cost fluctuations in highway construction markets. The Federal Highway Administration (FHWA) maintains a national cost index, and many state agencies have created their own versions to focus on state-specific costs. Researchers created a custom HCCI for the Michigan Department of Transportation (MDOT) as well as strategies for using the index beyond typical budgeting and estimating. These new tools will help MDOT develop more transparent and accurate construction cost estimates, as well as predict future budget needs based on market trends.

PROBLEM

A price index is a tool used by experts in a variety of sectors to measure inflation and estimate long-term expenses. In the transportation industry, an HCCI can be used to predict how much future highway projects will cost in consideration of market fluctuations, empowering agencies to budget effectively and procure competitive bids.

The costs of highway renovation, including earthwork, concrete pavement replacement and temporary traffic control, will be more easily and accurately determined using MDOT's new highway construction cost index.

FHWA produces a quarterly price index based on the national average of expenses. However, the real costs of highway construction may vary significantly depending on local market conditions. As a result, many state departments of transportation, including Iowa, Ohio and Wisconsin, have opted to develop their own indexes while others rely on those produced by neighboring states. In early 2020, the Michigan Senate passed a bill requiring MDOT to establish a state-level cost index and provide regular updates to lawmakers. Though COVID-19 ultimately prevented the bill from becoming law,

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> *"This project developed a powerful and versatile HCCI tool that will allow MDOT to calculate rising construction costs accurately over time, improving our budgeting and estimating practices."*
>
> **Kristi Kirkpatrick**
> Project Manager

MDOT decided to pursue the effort without an official mandate.

To improve its planning capabilities, MDOT sought to develop a methodology and tool for calculating the Michigan-specific HCCI and its historical trends. With these tools, MDOT would be prepared to determine future budget needs while potentially identifying and accounting for the reasons behind price changes in the past.

RESEARCH

Drawing from other agencies' methodologies to identify best practices and opportunities for improvement, researchers devised a custom plan for Michigan. The team conditioned MDOT's historical data, removing anomalies and outliers to achieve a reliable set of information. Combining this with sampled bid items to ensure reliability and an industry-standard formula for calculating HCCI, the team developed an index that incorporates a representative list of construction bid-items and historical prices pulled from Michigan's available bid data since 2010.

Researchers tested and compared the new index against those used by other state transportation agencies and FHWA, as well as labor reports and industry publications tracking the prices of specific goods and services. Initial findings led the team to develop further calculations for Michigan that consider specific items and geographic regions, giving MDOT an even greater ability to understand and manage the projected costs of construction for different bid items and local markets within the state.

RESULTS

Michigan's new HCCI tool is an automated calculation system in three parts: a database to store all historical bid item information, an HCCI algorithm and a user interface that allows MDOT staff to easily access the system and generate HCCI results.

To provide MDOT with guidance for maximizing the HCCI, the researchers conducted a literature search and nationwide survey to examine how indexes have been used by other state transportation agencies and FHWA. A second survey was directed to a group of MDOT staff to learn their goals and aspirational uses for the index.

Though participants reported a wide range of possible applications for the index, including forecasting construction costs, monitoring the construction market, comparing prices in other states, measuring purchase power and checking historical trends, the researchers identified three priority uses to help MDOT realize the greatest impact:

- *Budgeting*. The index can be leveraged to convert current dollar amounts into future dollars.
- *Cost estimating*. If data is unavailable, historical bid prices can be adjusted and substituted.
- *Project scoping*. The index can provide a five-year estimate of costs for any region in Michigan.

Additionally, the team encouraged close inter-departmental collaboration and data sharing but advised the index should be managed and maintained by only one dedicated MDOT official.

Finally, researchers noted that the COVID-19 pandemic may have significant economic effects that should be considered carefully when using the index.

VALUE

MDOT's new HCCI will provide the agency with guidance in projecting future funding needs. Developing and using more accurate highway construction cost estimates will help Michigan get the best use of its budget to serve the state's travelers and the entire transportation system. Improved monitoring, benchmarking and reporting on construction markets, made possible by the new index, will aid with budgeting, planning and setting priorities for years to come.

Research Administration

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Final report I is available at
www.Michigan.gov/documents/MDOT/SPR-1693a-Report_725089_7.pdf.

Final report II is available at
www.Michigan.gov/documents/MDOT/SPR-1693b-Report_723843_7.pdf.

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