Analysis of Material Source Mergers and Acquisitions on Project Delivery Quality and Costs

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INTRODUCTION

Merger and acquisition (M&A) activity, particularly in the transportation materials and construction industry, is analyzed relatively infrequently. However, this activity can significantly affect project completion, market control, and pricing. In many cases, collaboration between firms with similar goals and corporate growth strategies in a healthy market motivate consolidations. Attempts to increase market share and efforts targeting wider market access may also be factors in M&A activity. Companies may engage in consolidation activity with other entities possessing complementary strengths and assets. They may also want to consolidate with other companies to increase the diversity of the product they can offer to the market.

Figure 1. Diagram. M&A products.

Source: FHWA.

M&A activity can potentially eliminate cost brackets, harm competition, create inequitable market control, or result in price increases (figure 1). Any of these occurrences within the transportation materials and construction industry can alter bidding processes, consumer behaviors, and market attributes. The goal of this study was to investigate M&A activity and help transportation professionals become aware of how to identify consolidation activities and the influences these activities can have.

In 2006, an American Association of State Highway and Transportation Officials (AASHTO) survey found 11 of 38 participating States identified M&A activity as a prime driver behind bid price increases and competition decreases (FHWA 2006). A similar AASHTO survey in 2015 queried 32 States, and 17 expressed concerns about negative impacts of merger activities on bid prices.[1] Due diligence regarding fair bidding processes is required, and examining the effects of M&A activity on project costs has become necessary.

DATA ANALYSIS AND CHALLENGES

Data Processing and Analysis

To assess the effects of M&A activity, the team examined data across the United States to identify significant consolidation and pricing effects. Thirty-one States were identified as the initial analysis target for this study (table 1). Figure 2 shows the breakdown of the AASHTO regions.

The Federal Highway Administration (FHWA) supplied access to an Oman Systems, Inc., dataset containing quarterly bid price data from States, counties, and districts. The bid data included pay items and descriptions, quantities, units and prices, job numbers, bid dates, and project categories. State data analysis required sorting bid data for every year from 2006 through the third quarter of 2016. (Fourth-quarter data were unavailable during the analysis stage of this study.) Winning projects were sorted to include only those with materials commonly appearing in road-building projects, including concrete, asphalt, aggregate, and granular backfill materials. These relevant winning bid

Table 1. Analysis States.	
AASHTO REGION	STATES SELECTED
1	Massachusetts, New York, Pennsylvania, and Vermont
2	Arkansas, Florida, Georgia, Louisiana, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia
3	Illinois, Indiana, Michigan, Minnesota, Missouri, Ohio, and Wisconsin
4	Arizona, California, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, Oklahoma, Oregon, and Utah

Figure 2. Map. AASHTO regions in the United States (Historical MapChart 2022).
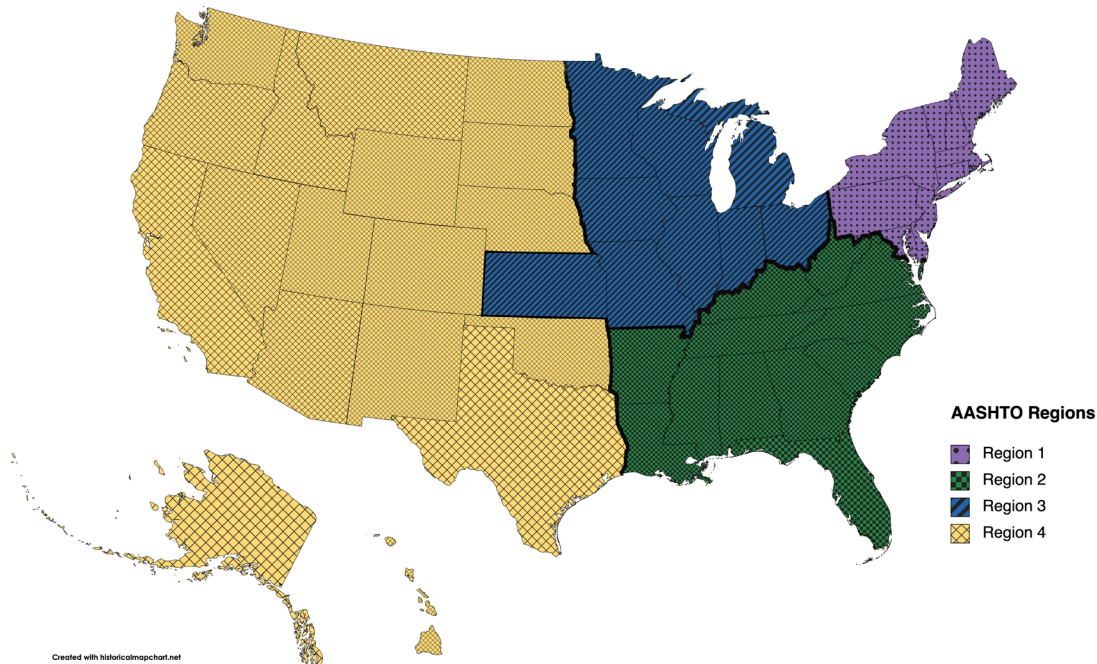
Original map © 2021 MapChart. Modified by FHWA to show AASHTO regions.

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[1] Committee on AASHTO Survey on Merger and Acquisition Activity; reported out during Subcommittee on Construction conference call in August 2015 and personal correspondence between authors and Marc Mastronardi in December 2017.

projects were then sorted by date and matched with corresponding contractor names and total project costs using Bid Express®, a software-based service provided by Infotech®, and historical bid data from individual States (collected both through personal contacts and from State public websites) when available (Infotech 2022). Individual States also provided known information on M&A activity. The research team also collected published information on acquisitions available through press releases and industry publications.

After construction projects were matched with contractor and pricing information, the researchers completed a secondary State-by-State investigation. This investigation involved analyzing the frequency of bidding by individual firms, item price changes within and across analysis years, and regional pricing analysis. By analyzing each individual State for unusually low or high prices, the team could identify and further analyze regions, projects, or years with disproportional costs. The researchers compared price dips and spikes against economic and market events (such as material shortages) and any merger, acquisition, or consolidation activity known in the area.

The team also analyzed State unit price data. Many State department of transportation (DOT) offices keep records of historical unit price data for all bid items included in lettings, sorted by date range. These data were requested for States when available and compared against actual unit prices of materials in bids for the corresponding years. The team identified abnormalities, including significant spikes above or below the unit price for that year. By using this analysis in conjunction with the dataset, these abnormalities could be attributed to specific projects, regions, and firms within the State. At that point, firm or material supply-related activities could be investigated. The following is a step-by-step description of the data analysis:

1. The raw data sheet for 1 yr (e.g., 2006) was opened, and filters were added for each column (State, pay item, description, quantity, unit, price, job number, bid date, county, and project type).

2. The State column was filtered to select one State (e.g., Virginia).

3. The description column was sorted to select concrete, asphalt, and aggregate items. This study limited analysis to only concrete, asphalt, and aggregate construction materials. A different study could be developed to look at other project component costs, such as engineering, geotechnical, signs, and testing equipment.

4. This selection was then copied and pasted into its own spreadsheet file.

5. Step 1 through step 3 were repeated with each year's raw data sheet, and each selection was pasted into the State-specific spreadsheet in chronological order.

6. The researchers attempted to identify, within each State-specific sheet, the most frequently occurring specific item for three material categories (concrete, asphalt, and aggregate). The more data points available for analysis, the more significant any results would be. However, in some States, no one item was used often enough to yield a meaningful analysis. This challenge is described in more detail in the Key Challenges subsection.

7. The data were separated for each specific item selected within one State by year. The following values were calculated for the one item for each year: average price for the year, maximum price for the year, minimum price for the year, and standard deviation.

8. A graph of each specific item's average price versus year was created for each State, resulting in two to three graphs per State (because some States only yielded two items for detailed analysis).

9. A table was then created for each specific item to display average price, maximum price, minimum price, and standard deviation for each year. This process resulted in two to three graphs and a corresponding table associated with each graph for every State.

10. Any unusual prices—such as very high average or maximum prices or very low average or minimum prices—or large standard deviations were flagged for further analysis.

11. Further analysis of unusual prices involved finding the item in the State's data sheet. From here, the researchers determined how often the unusual price(s) occurred. The job number, bid date, and county for these prices were identified. Then the job number and bid dates were used to find more details on this project through a combination of the State's DOT website and Bid Express. The project location was also investigated to see whether transportation costs or proximity to large urban areas perhaps played a role in the price.

12. Anecdotal information gathered from the State was also analyzed to assess if other factors contributed to the price, such as possible M&A activity, material shortages, economic conditions, and so on. This anecdotal information was cataloged and documented.

Key Challenges

Challenges and observations associated with this work are discussed in the following subsections.

Appropriate Bid Item Selection

It was evident from the beginning that selecting the relevant bid items from the large datasets for each project to match the materials being analyzed in this study would be challenging. Subsequently, evaluating these items against impacts from known mergers or acquisitions also proved cumbersome. Subject matter experts with estimating, construction, and bid-letting experience assisted in this data and bid item selection process. Next, the team matched these data items with contractor and price information found through State DOT websites and collected these data. Data were also collected online from Bid Express and required manual interventions, including matching data from individual projects shown in Bid Express. The lack of organization of the Bid Express data, as well as the variety of data formats provided by State DOTs (e.g., Excel® spreadsheets, PDF documents, text files), made the initial data matching difficult and time-consuming.

Trend Analysis and Comparison Difficulties Due to Inconsistent Individual Contractor Usage of Given Bid Items Across a Set Period

Many State DOTs keep a record of historical unit price data for all bid items included in lettings, sorted by date range. These data were requested for States of interest and were relatively easy to obtain and process. Items of interest included granular backfill, aggregate, concrete pavement, and asphalt pavement materials. These items were selected from the historical unit price datasets for comparison against the actual unit prices of those items in bids for corresponding years, as obtained from the Oman Systems, Inc., dataset.

Identifying which combination of contractor and item number would yield data for a majority of the analysis period (2006–2016) was one of the team's major challenges. There was no computer program that allowed for initial sorting to identify contractors that used a particular item of interest—as reported in both the FHWA and State DOT unit price data across most of the 10-yr analysis period—versus contractors that did not use the item. Consequently, time spent searching data by contractor would yield contractors that did not use the items of interest at all or only used them for 1 or 2 yr during the analysis period. Thus, analysis for that contractor across the whole 10-yr period was not possible. This process was further complicated by repeated use of "penny bids" or lower than expected pricing in certain bid items. The researchers were unable to review several known quantities individually due to these large pricing fluctuations across contractors.

Because of the aforementioned challenges, identifying contractors that consistently bid a particular item in the State's unit price data for at least 6 of the 10-yr period without massive fluctuations was time-consuming. The team accomplish this process mostly by sampling and checking work. Some insights were considered, including identifying very common or popular items, such as asphalt PG 58-28 paving grade asphalt binder in Wisconsin. This search yielded three contractors that used this item in projects over multiple years in the analysis period. In retrospect, this analysis could potentially be streamlined using a different methodology, such as using an experienced computer program coder to write scripts that could replicate these data sorting and matching processes in much less time, yielding more time for analysis of data trends and individual State case studies. States could, however, build a database and track these items proactively to assess the impact of the changes on the contractor pool.

Despite this rigorous and thorough analysis, the researchers did not identify any clearly defined, quantitative evidence of M&A impacts on pricing. Without these numerical examples, the researchers could not identify a quantitative approach to determining the impacts of this M&A activity on pricing.

LEGAL ANALYSIS

The team completed a desk scan to review prior merger cases in markets related to the transportation industry. The goal was to identify issues, antitrust incidents, and related activities. A review was conducted of how the Department of Justice (DOJ) and the Federal Trade Commission (FTC) *Horizontal Merger Guidelines* were applied to these mergers in the highway materials and construction fields (DOJ and FTC 2010). Current antitrust and economics literature was also analyzed, including a retrospective analysis of merger activity.

The purpose of the legal analysis was to provide resources and documentation for prioritizing possible State and Federal enforcement and monitoring efforts in markets related to highway materials and construction providers. However, case law ultimately determines actions taken, and most transportation construction materials markets do not have viable spare competitors. Another issue contributing to the impacts of M&A activity is the narrowing of product definitions (such as "aggregate" versus "qualified aggregate"). From case law, some trends were identified. Road-building materials are almost universally regarded as homogenous products, and, accordingly, courts routinely focused on evidence of postmerger control of output capacity when assessing anticompetitive effects.

Similarly, narrow geographies contribute as well: costs may be affected by high transportation costs, barriers to entry, and high sunk costs. No cases were identified where the potential entry or creation of a new entity was sufficiently realistic to offset anticompetitive effects. Rather, market entry was only feasible when an established competitor could purchase divested assets.

Market share strength can be determined using the Herfindahl-Hirschman Index (HHI) by determining individual firms' market shares in the relevant product and geographical market (DOJ 2018). These market shares are then squared and added together to determine the final HHI. The closer a market is to a monopoly, the higher the market's concentration (and the lower its competition).This process gives proportionately greater weight to larger market shares, and, in general, an HHI score of greater than 2,500 reflects a highly concentrated market likely to trigger interest from the FTC and the DOJ. A merger resulting in an increase in HHI of 100–200 points is also likely to raise competitive concerns sufficient to warrant agency scrutiny. Evaluating market share is a valuable tool to assess potential pressures on competition.

The legal analysis and literature reviewed for this study showed some price increases accompanied merger outcomes in most cases, regardless of policy action taken (Kwoka 2013). However, the amount of the increase varied considerably by the type of policy action taken. One study in Michigan found a merger that resulted in an 18.0 percent immediate increase in price, but two other studies found no statistical increase (Duplantis 2010). That Michigan effort also demonstrated no price increases 3 yr later. The study noted a 6.0 percent lower price for each doubling in the number of bidders and 5.6 percent lower prices for each doubling in the quantity of asphalt, potentially demonstrating strong support for project bundling to capture these lower prices.

RECOMMENDATIONS FOR STATES

The research team synthesized findings to provide guidance for State DOTs regarding identifying and assessing M&A activity. Case studies were conducted on nine selected States. Using the data, case law, literature, and case study interview results, the researchers identified a general set of recommended practices.

State Case Studies

The team completed case studies on selected States to gather further insights on State practices for M&A monitoring, project estimating, and bid letting. Nine States were selected: Arizona, Colorado, Georgia, Missouri, Ohio, Oklahoma, Oregon, Tennessee, and Wisconsin (figure 3). West Virginia was selected initially but declined to participate due to ongoing litigation regarding M&A activity.

For each State, bid items of interest were selected for price trend analysis. Of the items of interest, some yielded use data for multiple years and multiple

Figure 3. Map. Case study States (Historical MapChart 2022).
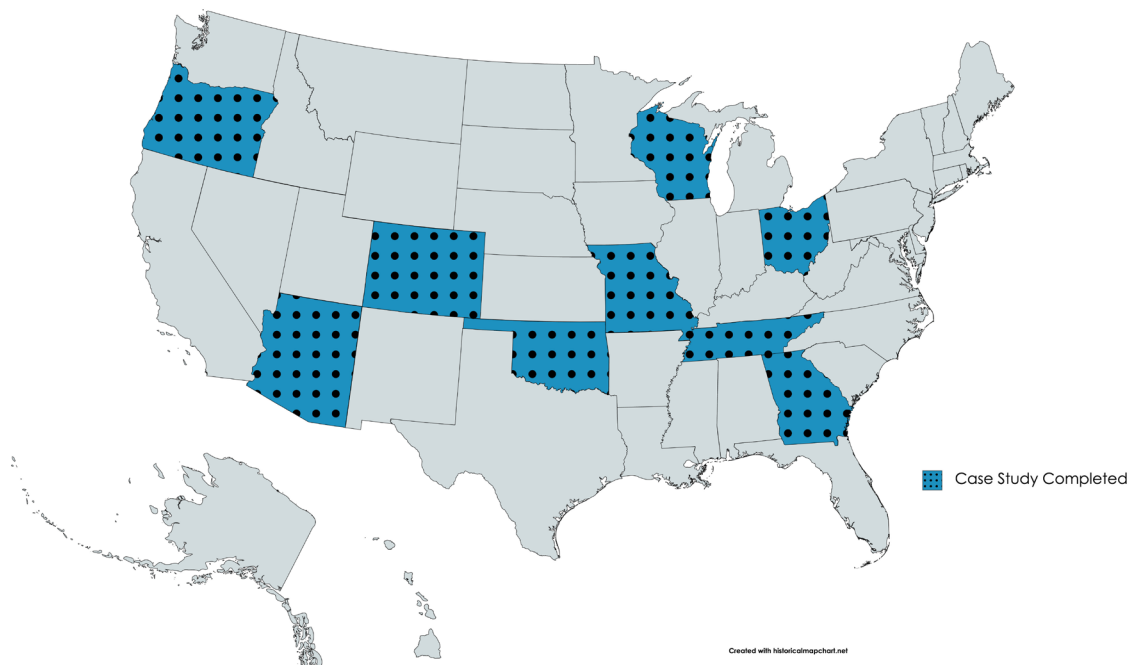
Original map © 2021 MapChart. Modified by FHWA to show the case study States.

projects, whereas others did not. For example, some selected items yielded data for five or fewer projects using the item across the analysis period. Stronger trend information is gathered with larger sample sizes; therefore, the researchers selected larger sample size items (items yielding more results) for detailed analysis in the case studies.

The study objective was to gain further State-specific information on the state of the practice and gain additional insights from selected States. The scope included analysis of the market and economic conditions of the local and State transportation region to assess the impact of supply on costs and quality. Case studies were gathered from in-person interviews of representatives from each State that included questions on prime contractor makeup; M&A activities within the State in aggregate, asphalt, and concrete areas; material supplier information; competition issues or concerns; bidding processes and analysis; unit prices; and general advice or observations.

In general, firm sizes across States range from small, family owned firms to large, publicly traded ones. While some States noted a decline in the number of firms, the number was generally stable. While limited proactive monitoring of M&A activity is a regular practice in the States, all States reported having some information available. Most States are familiar with providing information for screening when necessary. Some consolidation activity occurred among suppliers in the early 2000s, but there has not been much recent activity. Some issues have arisen due to land use restrictions and zoning, but, overall, competition appears to be healthy. More details are provided in the case studies in the final report (Silber and Bittner n.d.).

Identifying M&A Activity Remains Critical for State Analysis

Two main steps are needed when monitoring for negative impacts of M&A activity: first, States must identify the activity is taking place; and, second, they must assess the impacts (if any) this activity is having on pricing, competition, and market share. Guidance for identification of M&A activity is discussed in the following subsections. Many States reported limited proactive monitoring of M&A activity and reported further investigation only when prices rose dramatically above their internal engineers' estimates.

Proactive Monitoring

Even if no M&A activity was identified in previous years, States should continually monitor via the methods mentioned here. Proactive monitoring allows for more complete datasets and earlier identification

of abnormalities in pricing and competition, whether they are related to M&As or not. Early identification of abnormalities in bidding practices or pricing will allow States to investigate root causes, which may include material shortages or land use restrictions. By monitoring and collecting these data, States can create a more complete dataset. More complete, standardized, and high-quality data allow for possible future applications in predictive modeling to detect M&A activity and related impacts.

Among the preferred practices the team identified are close coordination with professional trade associations and assessment of industry health by monitoring company names and certified bidder lists. These two steps allow State agencies to identify market entrants and locations when possible. In many cases, name changes and ownership changes are synonymous. This monitoring is particularly important in cases with subsidiary or joint ownership activities.

Estimation Processes

The research team discovered wide variation in the estimation processes used to generate project estimates across the analyzed States. Some States have had success with an independent, in house estimation team responsible for following the process and generating project estimations. Overall, the case study States use historical prices to determine if submitted bid prices are acceptable. Independent analysis allows for estimations to be kept consistent, and the estimation team can then assist in examining unbalanced bids.

Tracking Firm Information

Understanding the makeup of the firms bidding on projects is vital for States. Many States reported having consistent pools of firms bidding on projects across years. Tracking firm names over time can aid in identifying merger activity. In addition to firm names and size, understanding where contractors are located, what their specializations are, and what projects they work on can help States identify competition issues. Use of project software such as AASHTOWare® Project SiteManager™ construction management systems, or similar, can also allow States to track project status over the project lifetime and evaluate contractor performance (AASHTO n.d.).

Regional Monitoring

Many States are divided into regions or districts for management purposes. Each region may have its own unique struggles or challenges with competition or material sourcing. For States with very diverse regions or districts, monitoring can be broken up into regional offices, where each region creates a team responsible for M&A monitoring and tracking.

Unbalanced Bid Analysis

A key indicator of M&A activity impacts includes abnormal pricing during bidding. Some States reported already using unbalanced bid analysis. The researchers recommend all States adopt an unbalanced bid analysis process consistent with FHWA's policy for "Award of contract and concurrence in award" in 23 CFR § 635.114 (Code of Federal Regulations 2021).

Tracking Cost Indexes

Construction cost indexes are a useful tool for tracking price trends over time and comparing these trends to those seen in localized bid pricing. Most construction indexes use cost of inputs, including labor, material, and equipment, when developing the data. The cost indexes can measure price movement for key objects over time or by location. By tracking cost indexes for key materials (e.g., Wisconsin tracks 100 items), usually common bid items, a State can identify more easily if a bid price change is due to M&A activity or other sources. At a minimum, this comparison against indexes allows for the identification of potential issues throughout each year's budget setting.

Diminishing Negative Impacts of M&A Activity

Not all M&A activity has a negative impact on a market. After States identify that activity exists, using a clear and systematic process for assessing the impacts of this activity to determine if the effects are negative is equally important. Many States observed that trade associations or agencies such as AASHTO were a reliable source of information on M&A tracking and impacts. Also, agency oversight of State data and activity can allow for merger effects to be identified throughout the country.

If a State has identified M&A activity as the source of bidding, pricing, or competition issues, several key steps can be taken. First, the State should complete an analysis of any bids identified as unbalanced. Identifying abnormalities in bid pricing not caused by material shortages can allow the State to better understand factors driving the price up (or down). Part of this price analysis should include collaboration and comparison with neighboring States.

Second, on completion of the bid analysis, the State should work to identify which areas of the State or which projects are being affected (e.g., all projects involving aggregates, all projects in the southeast region). This step will lead to identifying where the competition issues are being experienced. If an area is identified as having minimal bidders or suppliers, four main options should be considered to mitigate these

impacts: control material supplies at the State or agency level, bid smaller lettings more often, utilize project bundling, and utilize alternative contracting methods. As discussed, some research has shown a positive benefit to pricing by leveraging larger numbers of bidders.

If a pricing concern leads to identification of an area with minimal bidders and suppliers due to recent M&A activity, the State could consider providing publicly owned or State-controlled sources for those project materials. Areas with minimal bidders can also be aided by bidding projects more often (weekly or biweekly) instead of monthly, for example, thereby allowing more companies to bid a higher number of proposals in smaller lettings. Project bundling is another method States can use to increase competition in an area with minimal competition or bidding. Project bundling could incentivize contractors to move into an area in which they may not currently work.

States have also had success by using price adjustment clauses for certain materials and rejecting noncompetitive bids and readvertising (AASHTO/FHWA 2012). Several other approaches have been attempted with varying levels of success in attracting additional bidders. Among the most prevalent in the survey were balancing work types, allowing use of alternative materials, and rejecting noncompetitive bids.

CONCLUSION AND FUTURE RESEARCH

While the quantitative analysis revealed instances of mathematically unbalanced bid prices, price anomalies, and items of interest, the research could not identify a quantitative approach to determining negative impacts of M&A activity on pricing through the data analysis completed. There was no apparent link between M&A activity in the areas and reported bid prices on winning projects. The research team identified some potential opportunities to better monitor and complete project conduct and bidding, including potential use of indexes to determine market share and market power, or additional scrutiny on unbalanced or complementary bidding. Close communication with the industry, regular review of prices, and assessment of regional information were all identified as preferred practices by the research team and subject matter experts.

Potential future related research could include application and guidance for applying HHI analysis at the State and regional levels, adopting standards for price estimation, and understanding the impact of alternative contract methods and project bundling on overall project costs and completion.

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