DOES P3 FAVOUR LARGE COMPANIES? FROM EQUITY FINANCING TO SOCIAL EQUITY

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Ensuring equity in contracting participation is of critical concern to transportation agencies. In the US, federally funded projects have goals of participation from firms owned by socially and economically disadvantaged individuals, and the initiative is the Disadvantaged Business Enterprise (DBE) program. While the requirements apply to any delivery methods, public-private partnership (P3) - often featuring a big size Design-Build (DB) contract, equity financing, and a long concession period - has received particular attention. There is an argument that P3 disproportionally benefits large companies compared to other delivery methods. Admittedly, limited design in the procurement stage creates challenges in enlisting specific DBEs in the proposal. Promoting DBE participation, on the other hand, is DBE performance plans, which many agencies require as a bid submittal to ensure adequate commitments and good faith efforts. Thus, whether P3 makes a difference in the execution of the DBE program warrants an empirical evaluation. This study examined 134 contracts from the US Major Transportation Project Database on four metrics: DBE goal, DBE commitment, DBE attainment, and DBE performance. The Kruskal-Wallis tests were performed on both DBE goal and DBE performance. The mean DBE goals are significantly larger for P3 and DB/Construction Manager at Risk (CMAR) than Design-Bid-Build (DBB). However, there is no significant mean difference for DBE performance among DB/CMAR, DBB, and P3. Among the different types of P3, DBFOM shows the greatest good faith efforts, due in part to the developer's high-level involvement. The authors recommend using a graphical tool called DBE envelope to help visualize DBE efficacy and performance.

Keywords: disadvantaged business enterprise, PPP, equity, performance

INTRODUCTION

Addressing disparity surrounding race, gender, and ethnicity is of critical value to governments (Riccucci 2009). Increasing economic diversity fosters innovation (Stirling 1998) and workforce stability, among other benefits (Myers 2011). Hence, government procurements, especially of transportation projects, have embraced social equity, whose initiatives range from environmental justice in minority and low-income populations and equal employment opportunity to equitable contracting opportunity (Sanchez *et al.,* 2003). One of the programs tackling social equity in contracting is the Disadvantaged Business Enterprise (DBE) program of the US Department of Transportation. The DBE program originated from Title VI of the Civil Rights Act of 1964 and, through a series of laws, executive orders, and

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regulations, has developed into its present form (Gendell *et al.,* 1990). The Surface Transportation and Assistance Act of 1982 officially created the federal program to ensure at least 10% of the federal funds be allocated to minority-owned firms (Brown 1990). In 1987, the Surface Transportation and Uniform Relocation Assistance Act added women-owned businesses into the 10% aspirational goal. To support federal compliance, state transportation agencies (STAs) administer their own DBE programs.

Although the DBE requirements apply to any delivery methods, public-private partnership (P3) has received particular attention. P3 is an integrated delivery approach where the private sector firm performs a combination of services involving design, construction, finance, operation, and maintenance for a specified concession period (Perez 2016). P3 has embraced popularity in the US. As of August 2018, 36 states, plus the District of Columbia and Puerto Rico, have passed P3 authorizing legislations (FHWA 2018a). Because P3 usually entails a sizable Design-Build contract and a long concession period, it may seem that P3 favours large companies. The claim is not without merit, considering the contract documents on which proposals are based have only minimal design. Hence, it is difficult for the proposers to identify enough DBE subcontractors with binding quotes upon awarding the prime contract. However, the potential shortfall of DBE participation can be made up with the help of DBE performance plans detailing compliance strategies. There is no published literature on the impact of delivery methods on DBE participation, which this paper intends to investigate.

DBE PRACTICE REVIEW

DBE goal setting

The US Department of Transportation administers its DBE program in accordance with Title 49 Code of Federal Regulations (CFR) Parts 23 and 26 (FHWA 2018b). The regulations require an STA receiving federal-aid funds to set triennially an overall goal that is reflective of the DBE availability of the state. In some cases (usually for megaprojects), an STA may set up a project goal that is calculated and monitored separately from the overall goal. Additionally, if an STA finds that the overall goal cannot be met through exclusively race-neutral means, the agency may use a contract goal. The race-neutral measures, as delineated in 49 CFR § 26.51, represent customary acquisition procedures - such as providing technical and management assistance - that foster DBE participation in prime contracts. Subcontract awards to DBE firms in excess of the overall goal or on prime contracts without a DBE goal also constitute race-neutral participation. Race-conscious participation, in contrast, involves the use of contract goals and, in rare cases, set-asides for socially and economically disadvantaged firms (Keen *et al.,* 2015). STAs should be cautious about using contract goals arbitrarily, in light of the Ninth Circuit decision in Western States Paving Co. Inc. v Washington State Department of Transportation [2005], where the court ruled the use of the contract goal inappropriate. The decision prompted FHWA to call for a suspension of the use of contract goals for the STAs in the Ninth Circuit until evidence supporting the existence of a discriminatory market can be furnished (FHWA 2018c). Another seminal case, City of Richmond v J. A. Croson Co. [1989], established the strict scrutiny standard to assess the constitutionality of a race/gender classification program authorized by state and local governments. The strict security test validates the use of contract goals to the extent that statistical and anecdotal evidence of disparity can be demonstrated between the utilization and availability of minorities. In Adarand Constructors, Inc. v. Peña [1995], the court extended the strict scrutiny standard to the DBE program.

Setting overall goals typically involves two steps. Step 1 calculates the value-weighted relative availability of DBEs that are ready, willing and able to perform. Step 2 is the adjustment of the Step 1 base figure considering past DBE participation, evidence from disparity studies, the ability of DBEs to get financing, bonding, and insurance, etc. (FHWA 2014). Then, the public is asked to provide comments on the draft goal-setting methodology. Contract goal setting involves identifying the portion of the contract that can be subcontracted to DBEs before contract letting (Brown 1990). When developing contract goals for projects using alternative contracting methods, incomplete information of work items due to incomplete design is a challenge. Other sources of complexity include proper adjustment of the goal for concurrent projects in the region, the long duration of the DB contract, aligning request for proposal language with the goal, and conveying the DBE program expectations to bidders (Keen *et al.,* 2015; Amekudzi-Kennedy *et al.,* 2016). Consequently, some STAs require a DBE performance plan detailing the contractor's/developer's will and ability to engage DBEs in the bid submittals. Such a plan typically includes specific DBEs for design activities, potential subcontracting opportunities for DBEs, a schedule to identify those DBEs, and procedures entailing commercially useful function validation, termination of DBEs, and prompt payment of subcontractors, etc. And the plans are sometimes scored in the evaluation of the proposals. Also, setting subgoals (e.g. isolating design from construction), unbundling work packages to create subcontracting opportunities, and more communication between the DBE staff and the project planner are best practices bolstering DBE utilization while related to goal setting (Ashuri *et al.,* 2019). For Construction Manager at Risk (CMAR) projects, goal setting can wait until the award of the construction contract (Keen *et al.,* 2015). It is worth noting that states are different in terms of setting one or two goals for design and construction in a DB project or the DB portion of a P3 project. There are only a handful of states that set DBE goals for the operation phase of a P3 (Smith *et al.,* 2019).

DBE commitment

The FHWA (2018b) encouraged agencies and proposers of contracts using alternative contracting methods to conduct meaningful (not pro-forma) outreach to and training for DBEs. Agencies' outreach allows early identification of DBEs for pre-award professional services and a larger pool for potential DBEs of different construction trades. Contractors can use the pool to find suitable DBEs quickly. Kyle *et al.,* (2013) reported that agencies' outreach to and one-on-one consulting with DBEs are the most effective strategies to promote DBE participation. These resources and activities help bidders submit - upon or immediately after contract award - a list of DBEs to be included in the contract. This list, along with documentation in support of efforts enlisting DBEs, becomes DBE commitment. For this research, DBE commitment is the percentage of contract value that the winning bidder says would be apportioned to DBEs relative to the value of the prime contract. If a bidder cannot identify enough DBEs to meet the contract goal, they must show good faith efforts to solicit DBEs.

Good Faith Efforts

Furnishing the documentation required to show earnest solicitation of DBE subcontractors is the core of pre-award good faith efforts. The idea of pre-award good faith efforts is a balance between fostering DBE participation and Adarand's spirit of surviving the strict scrutiny, which effectively sets an upper bound for goals (Bruce *et al.,* 2015). Post-award good faith efforts relate to terminations and substitutions of

DBEs. Contractors/developers who committed to contract goals cannot terminate a DBE subcontractor barring a good cause and a proper notice. When substituting a terminated DBE, the contractor/developer should exercise good faith efforts to find another DBE to perform at least the same amount of work. Monitoring and documenting good faith efforts are necessary to hold accountable the contractor/developer making DBE commitment. Federal regulations (49 CFR§ 26.53) require the contractor/developer to provide sufficient documentation showing that good faith efforts were spent to meet the contract goal.

DATA AND METHODS

This research aims to examine the performance of the DBE program through evaluating at the contract level four metrics. A DBE goal is the DBE share of the contract value that the agency expects to achieve on the contract. The goal may or may not be a contract goal. DBE commitment is what the winning bidder committed to achieving upon or immediately following contract award. DBE attainment is the actual DBE participation at project completion. This paper introduces a fourth metric - DBE performance. The metric is the growth of DBE participation from what is committed to the actual achievement, hence, a measure of post-award good faith efforts. Mathematically, DBE performance is the quotient of DBE attainment and DBE commitment minus one ($\frac{\text{DBE Attainment}}{\text{DBE Commitment}} - 1$). The data collection is part of the research team's effort to build the US Major Transportation Project Database, which houses detailed project life-cycle data ranging from cost and schedule to change orders and claims. The database collects DBE goal data from requests for proposals or invitations for bids. If a project has separate design and construction DBE goals, then only the construction DBE goal is taken into account, because design DBE goal is a proportion of the total design contract value, which is not available. DBE commitment is the committed DBE participation that appears in construction contracts or public-private agreements. The percentage, if not reported, is taken the same value as the DBE goal for the purpose of the analysis. For P3 projects, the authors consider only the design and construction portion since few projects have DBE goals for the operation phase. One project that reports DBE goal and commitment for operation and maintenance work is Transform 66 - Outside the Beltway in Virginia. However, the actual DBE participation was reported in the early stage of construction, thus not a valid DBE attainment datum. In fact, 37 federal-aid projects from 13 states have valid data for DBE attainment. Another 97 projects have only DBE goal and DBE commitment data. Thus, a total of 134 prime contracts representing 22 states comprise the dataset for analysis. Project size ranges from $2.7 million (I-74 Iowa-Illinois Corridor Reconstruction Project Phase 2 - Iowa Ramp and Mainline Storm Sewer) to $3.1 billion (Tappan Zee Bridge Replacement in New York), with a mean of $365.3 million and a median of $120.4 million. The numbers of projects for DB, CMAR, Design-Bid-Build (DBB), Design-Build-Finance (DBF)/Build-Finance (BF), Design-Build-Finance-Maintain (DBFM), Design-Build-Finance-Operate-Maintain (DBFOM), and Design-Build-Maintain (DBM) are 25, 2, 76, 4, 2, 17, and 8, respectively. The numbers of projects with all three metrics - DBE goal, DBE commitment, and DBE attainment - are 11, 1, 12, 1, 11, and 1 for DB, CMAR, DBB, DBF/BF, DBFOM, and DBM, respectively.

The authors compared the averages of DBE goal, DBE commitment, DBE attainment, and DBE performance among DB/CMAR, DBB, and P3, and among the different varieties of P3. Since the metrics are all ratios that depend on contract values, two

types of means were considered: simple average ($\frac{1}{n}\sum_{i-1}^{n} z_i$) and value-weighted average ($\frac{\sum_{i=1}^{n} x_i}{\sum_{i=1}^{n} y_i}$), where $z_i = \frac{x_i}{y_i}$. Besides, the authors subtracted from a DBE goal the overall goal when the DBE goal was set to isolate the state effect. The resulting difference is called adjusted DBE goal. The authors were able to find the historical overall goals for 91 contracts. Group means of adjusted DBE goal and DBE performance were compared with respect to the delivery method. By the Levene's test, the group populations of adjusted DBE goal have the same variances at the 0.05 level of confidence (F = 1.506, p = 0.002). The Kolmogorov-Smirnova test suggests that the residual for adjusted DBE goal is not normally distributed (KS = 0.094, p = 0.045). Upon examining the residual's kurtosis, the z-score is 2.86, hence more evidence of non-normality. Therefore, the Kruskal-Wallis test is proper to check the mean ranks of adjusted DBE goal. For non-parametric multiple comparisons, it is customary to use the Dunn's test with the Bonferroni correction. Similarly, for DBE performance, the variances in the three groups are equal (Levene's F = 2.242, p = 0.122), but the residual distribution is not normal (SW = 0.912, p = 0.006). Again, the Kruskal-Wallis test was performed on DBE performance (Lomax and Hahs-Vaughn 2013).

FINDINGS

Without adjusting for the overall goal, DBB has the smallest DBE goal in terms of both the simple average (8.0%) and the value-weighted average (10.0%), compared to DB/CMAR (simple average = 12.7%, value-weighted average = 12.0%) and P3 (simple average = 10.0%, value-weighted average = 10.3%). The simple and value-weighted averages of adjusted DBE goals have the same ranking - that DB/CMAR (1.0%, 1.1%) is larger than P3 (-0.9%, -0.6%), which is larger than DBB (-3.9%, -3.5%). Further, for adjusted DBE goal, the mean ranks of DB/CMAR (62.97) and P3 (54.75) are significantly larger than DBB (35.25), as shown in Table 1. An explanation is that for alternative project delivery methods, there are few pre-award contracting opportunities for professional services due to the agency's minimal design, and those contracts could have gone to DBEs. To compensate for the lost DBE participation, STAs tend to aim for higher contract goals for DB, CMAR, and P3, relative to DBB. Figure 1 plots the DBE goals of the 134 projects with respect to the delivery method and the contract value.

Table 1: Mean rank comparison result for adjusted DBE goal

Kruskal-Wallis Test			Dunn's Multiple Comparison Test		
N	Chi-Square	p		Statistic	p
91	15.278	< 0.001	DBB - P3	-19.542	0.008
			DBB - DB/CMAR	24.375	0.003
			P3 - DB/CMAR	4.833	1

For DBE performance, the Kruskal Wallis test result ($\chi^2 = 0.447$, p = 0.8) suggests that the mean ranks are not statistically different among DB/CMAR (18.08), DBB (18.17), and P3 (20.62). In the 37 projects with DBE attainment data, P3 is the largest in terms of both simple average (26.3%) and value-weighted average (32.8%). The second in the rank is DBB by the simple average (21.5%) and DB/CMAR by the value-weighted average (10.3%). Consequently, the simple average has DB/CMAR (8.7%) third in the rank, and DBB ranks third by the value-weighted average (4.8%). The reason why DBB ranks lower by the value-weighted average is that the contract

size tends to be smaller for DBB, considering the mean contract values are $729.3 million, $178.2 million, and $1.2 billion for DB/CMAR, DBB, and P3, respectively. Figure 2 shows the distribution of DBE performance by the delivery method. It is comforting to know that, on average, DBE goals were satisfied for all three groups. More importantly, developers in P3s spend no less good faith efforts in retaining DBEs than do contractors in the other delivery methods. This is due in large part to DBE performance plans and the continued documentation and periodic reporting of the good faith efforts, which help meet the goal. Another explanation is that because the developer signed up for a long-term relationship with the STA, they are more motivated to impress the owner by demonstrating good faith efforts.

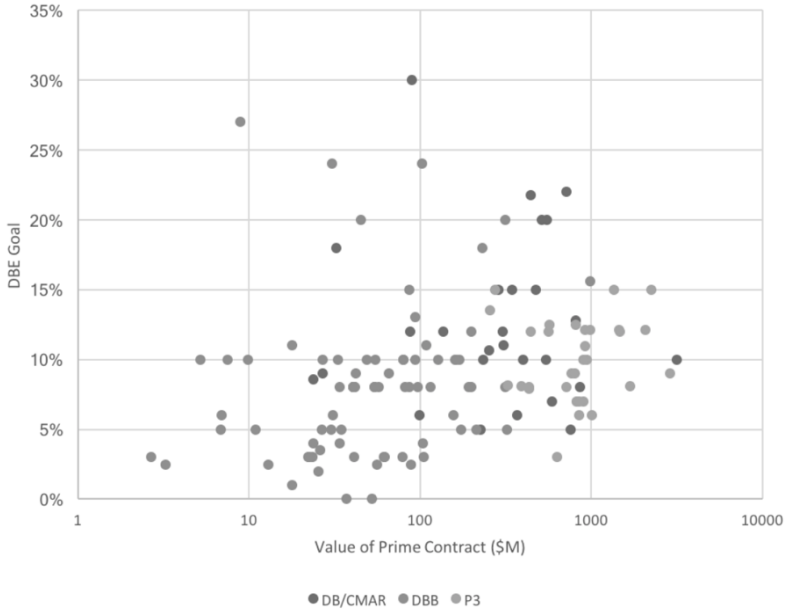

Figure 1: Distribution of DBE goal

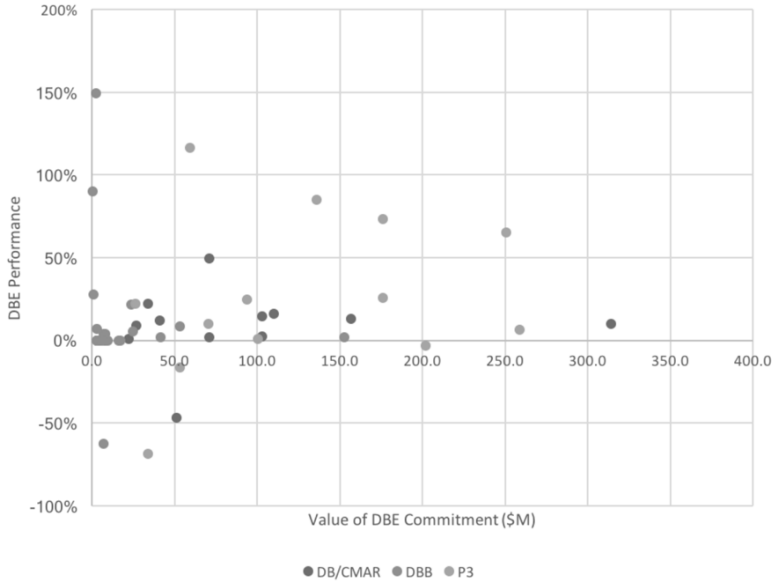

Figure 2: Distribution of DBE performance

To better understand and characterize a DBE program, the authors developed a visual tool called the DBE envelope. This radar plot shows the goal, commitment, and

achievement of DBE participation. An equilateral triangle means that the contracts have committed exactly to the goal and accomplish exactly what had been committed. Figure 3 suggests that DBFOM (10.9%) and DBM (10.9%) are larger for the DBE goal than DBF (7.9%), which has only one project - the iROX in Florida. The DBE goal for iROX is lower than the overall goal (8.12%) when the project was put out for bid and the value-weighted average DBE goal for all P3 projects (8.6%) in the state, which uses 100% race-neutral measures. The gradient of the right boundary represents the DBE performance, i.e., post-award good faith efforts. The slope of the left boundary embodies the efficacy of the program - defined as $(\frac{\text{DBE Attainment}}{\text{DBE Goal}} - 1)$. DBE efficacy captures both the pre-award and post-award good faith efforts. The level of post-award good faith efforts - calculated using the value-weighted average - is the greatest for DBFOM (37.2%), followed by DBM (0.8%), then DBF/BF (-68.4%). So is the steepness of the right boundary in Figure 3. Similarly, the ranking of the mean DBE efficacy from high to low is DBFOM, DBM, and DBF/BF. It is not surprising that DBFOM relates to the greatest post-award good faith efforts because the developer has the most involvement in this type of contract. The fact that DBE performance is overall - albeit not significantly - larger than DB/CMAR and DBB suggests that the level of involvement could play a role. Although the rankings of the mean DBE goal and the mean DBE performance are not representative of the populations, DBE performance carries more weight because it has, by definition, accounted for the DBE availability.

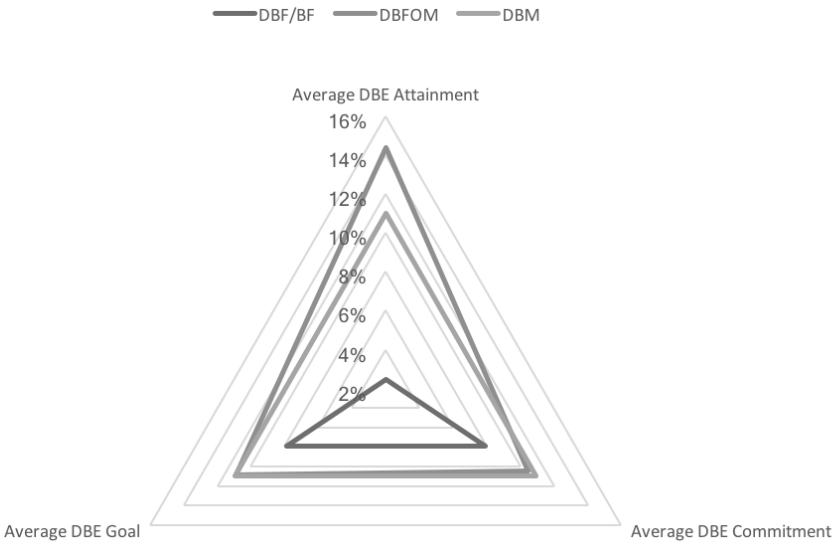

Figure 3: DBE compliance for different P3 types

It is reasonable to rid the metrics of the state effect when comparing contracts from different states. Such is the case with the DBE envelope in Figure 4, where a comparison of DBE participation between DB/CMAR and P3 among three states was made. In terms of value-weighted average DBE goal, Texas (12.1% vs. 12.8%) and Florida (8.6% vs. 15.0%) are lower for P3 than DB/CMAR. P3 also underperforms DB/CMAR for Texas (10.8% vs. 12.8%) and Florida (8.6% vs. 15.0%) for the simple and value-weighted average DBE commitment. The DBE attainment value-weighted averages are larger for P3 than DB/CMAR for all three states in the comparison: Texas (18.8% vs. 14.6%), New York (12.5% vs. 11.0%), and Florida (10.7% vs. 8.0%). P3 is also consistently larger than DB/CMAR for the value-weighted average DBE performance in Texas (74.3% vs. 14.3%), New York (24.7%

vs. 10.0%), and Florida (25.2% vs. -46.7%). These results follow the previous observations that - despite trivial difference, P3 is associated with lower goals and greater post-award good faith efforts than DB/CMAR. This finding is clear of the effect of DBE availability, a component of the state effect. Another component is the agency's approach to using contract goals for alternative project delivery methods. Procedures differ in such areas as the inclusion of the DBE language in the request for qualifications, the timing of commitments, and the use of DBE performance plans (Keen 2015).

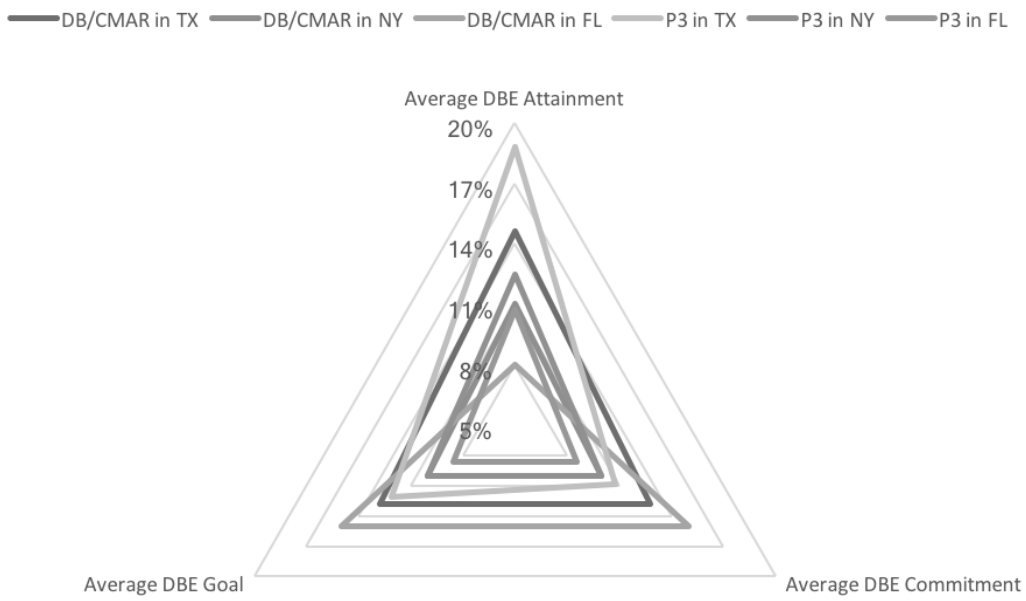

Figure 4: State DBE compliance for DB/CMAR and P3

CONCLUSION

While P3 has garnered increasing interests among transportation agencies in the US, opponents raise suspicion that taxpayers' money goes disproportionally to large companies in the P3 market, compared to other delivery methods. This paper provides empirical evidence on whether P3 discourages the participation of minority firms, which concerns race-classification programs. The DBE program under the US Department of Transportation regulates how federal-aid funds are distributed to certified DBEs through race-neutral and race-conscious measures. The former relies on customary contracting procedures to meet the overall goal, whereas the latter refers to compliance requirements when contract goals are involved. A P3 - due to its large size - bears vast significance in terms of DBE participation and can be treated differently when setting a goal. Despite challenges such as design uncertainties that render a complete DBE list improbable, state agencies have devised such strategies as creating sub goals for design and construction and requiring the use of DBE performance plans.

The authors collected data on three metrics - DBE goal, DBE commitment, and DBE attainment - from the US Major Transportation Project Database. A fourth metric, DBE performance, was calculated to measure the level of post-award good faith effort. The dataset contains 134 contracts, in which 37 have DBE attainment data. The dataset was processed to find if the project delivery method affects the DBE goal and DBE performance. It turns out that the mean DBE goal is larger for P3 and DB/CMAR than DBB at a significance level of 0.05. Comparatively, there is no

significant mean difference in DBE performance for the three delivery method groups. DBFOM shows greater good faith efforts compared to other P3 types, due in part to the developer's high-level involvement. The results refuted the claim that P3 favors large companies. When comparing the averages, the authors found the DBE envelope handy to visualize DBE efficacy and performance, which defined the slopes of the left and right boundaries.

Despite a small dataset, this research is exploratory in asking the question and produce valid results that the extant literature fails to report. Future research could use more data to validate these findings and perform a regression analysis to identify more predictors that influence the DBE goal or DBE performance. Moreover, an investigation of the federal regulations governing the DBE program in relation to DBE performance is intriguing and promising.

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