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Project Title

Incorporation of Social Equity Considerations into Transportation Asset Management

University

Colorado State University

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Research Needs

The transportation industry, much like many other industries in the United States, is at a crossroads. There is a dire need for transportation professionals to acknowledge the significant social equity challenges faced in our nation, as evidenced by recent national events, and incorporate considerations of social equity into decision-making for transportation projects. The fact that it is now the time to think about social equity in the context of transportation is evidenced by the recent Transportation Research Board (TRB) Conference on Advancing Transportation Equity. This inaugural conference, held in September 2021, had the theme “Bridging the Divide: Connecting People, Research, and Practice” and brought together transportation policy-makers, practitioners, educators, and researchers (TRB 2021a). Multiple

plenary, technical, poster, and roundtable discussion sessions in this conference highlighted the notion that the time is right for recognizing social equity considerations in transportation and advancing transportation equity. Additionally, the conference emphasized the need for developing a transportation research agenda focusing on equity issues. Specifically, the plenary session entitled “Transportation Research on Equity” discussed the need for more research investigating the social impacts of transportation decisions (TRB 2021b).

The need for incorporating social equity into transportation decision making has been mostly recognized in the transit sector of the transportation industry. The Federal Transit Administration (FTA) led early efforts to explore the concept of social equity within transit systems, including how transit planning, investment, and operations impact low-income and marginalized populations in areas highly dependent on transit. Recently, the COVID-19 pandemic has triggered renewed interest in social equity across many local, state, and national transit agencies (FTA 2021). Despite budget shortfalls facing public transportation agencies prior to the pandemic, which were exacerbated by reduced demand during COVID-19, transit agencies across the U.S. mobilized existing resources and federal funding from the Coronavirus Aid, Relief, and Economic Security (CARES) Act of 2020 to support communities in new and creative ways (Hu and Chen 2021). For example, the National Center for Mobility Management and the National Aging and Disability Transportation Center began partnering directly with public health organizations to increase equitable vaccine access. These partnerships included providing free rides to vaccination sites, utilizing transit buses as mobile vaccination clinics, and repurposing transit hubs into mass vaccination sites (Mader 2021). Transit agencies also mobilized resources in response to existing community inequities which were exposed by the pandemic. For example, many students did not have adequate Wi-Fi connectivity at home to participate in remote learning, so buses were used to provide internet access. Ultimately, the pandemic forced many transit agencies to think outside the box and quickly implement creative solutions to social challenges. The national government is actively working to build upon this momentum towards improving social equity. President Joe Biden signed Executive Order 13985 – Advancing Racial Equity and Support for Underserved Communities Through the Federal Government – in January 2021 (Office of the President 2021). This executive order directs all federal agencies to identify and implement strategies for improving equity in communities that have been systematically denied economic or social opportunities. The impact of the executive order can already be seen in the transit sector, with the FTA announcing new funding specifically for projects aimed at improving transit services in rural and urban communities experiencing long-term economic distress (FTA 2021).

While these efforts in the transit sector are encouraging and show that social equity can, indeed, be incorporated to transportation decision-making, social equity should also be considered in other areas of transportation, such as asset management. Transportation asset management processes have traditionally sought to ensure safety and functionality while minimizing cost. Although there is a wealth of research involving life cycle cost analysis and similar techniques to facilitate construction, inspection and maintenance decision making, these techniques are old-fashioned in their emphasis on economic factors as drivers of engineering decisions. The building industry has long been looking beyond just economic factors in asset management decision-making and has embraced the sustainability concept, primarily through the development and adoption of sustainability rating systems (Clevenger, Ozbek, and Simpson, 2013). However, the development and use of sustainability rating systems has been slow in the transportation

industry (Krekeler, Nelson, Gritsavage, Kolb, and McVoy, 2010). Notwithstanding this, the last decade witnessed the development of a number of sustainability rating systems for the transportation industry (Oluwalaiye and Ozbek, 2019). While this is an indicator that more attention has started to be paid to considerations other than just economic factors (such as environmental and social factors) in transportation asset management, a Mountain-Plains Consortium research project which investigated multiple transportation sustainability rating systems identified that the social factors tend to have the least amount of consideration, based on the credit/point distribution across the economic, environmental, and social categories (Simpson, Ozbek, Clevenger, and Atadero, 2014).

In alignment with the overall need for advancing transportation equity as outlined earlier, modern transportation asset management must reflect the challenges posed by social factors, including increased demand for equitable transportation services across racially and socioeconomically diverse communities. Asset management frameworks, regardless of the specific tools they utilize, need to incorporate social equity into decision-making. In managing assets, the decisions must assess how well different options align with equity targets or values (Kizner and Lee, 2021). As argued by Kizner and Lee (2021), equity is an important layer that should be built into asset management and should be considered throughout the lifecycle of transportation assets. Furthermore, equity should be well-defined and measured, resulting in the acronym SMART (Specific, Measurable, Achievable, Realistic, and Timely) targets to change into SMARTIE targets with the addition of “Inclusive” and “Equitable” goals (Kizner and Lee, 2021).

Given all of these, there is a need to have a critical look at traditional transportation asset management frameworks and identify strategies to incorporate social equity considerations into asset management decision-making in transportation.

Research Objectives

1. Identify key concepts in social equity as defined by academic literature, by the state of practice in local governments and by members of community-based organizations.
2. Inventory existing practices used to consider social equity in transportation related areas of decision making, including their strengths and limitations.
3. Establish a definition of social equity that fits the context of asset management decision making.
4. Select indicators (both quantitative and qualitative) that can be used to assess the level of social equity based on the definition established in objective 3.
5. Propose a preliminary framework that begins to integrate various indicators of social equity into a decision-making process that can be applied to transportation assets.

This proposal describes an initial effort to apply the criterion of social equity to a systematic process for transportation asset management. As such, the first objective seeks to understand the current state of the art by studying how equity is defined within different transportation related fields and by different people working in the space (ranging from academics to local government personnel to members of the public and the community-based organizations that represent them). The second objective also seeks to establish the state of the art by collecting examples of current practices that are used to apply social equity to transportation related areas. Based on the definitions of equity we collect and how those definitions are applied (or not) in existing

practices we will craft a definition of equity that fits the asset management context, and which will serve to guide the remaining efforts of the project. The equity definition selected in objective three will be operationalized in objective four when we select variables and other indicators that can measure the social equity implications of a decision. Finally, in objective 5 we will work to integrate quantitative and qualitative measures of social equity into an initial framework that seeks to support social equity through the intentional management of transportation assets.

Research Methods

We will achieve objectives one and two, defining social equity and inventorying existing practices to consider social equity in engineering decision making, using literature review and surveys and interviews with local government personnel and/or staff or members of community-based organizations. The literature review will make use of traditional academic databases and journal publications, however we will also make a careful effort to search more broadly for examples of cities, counties and other jurisdictions beginning to consider equity in their work as well as community-based organizations specifically advocating for transportation and infrastructure equity. For the interviews we will develop a set of questions and pilot the questions with local agencies and organizations such as the City of Fort Collins and Larimer County before interviewing other organizations. Following the interviews, we will craft a survey to collect data about equity in asset management and engineering decision making from a broader range of local agencies and community-based organizations. The interview and survey procedures will be vetted through the CSU IRB prior to any use with research subjects.

Following data collection, we will use thematic qualitative analysis to analyze the survey and interview findings. We will compare responses to the interviews and surveys to academic definitions of equity found in the literature review and synthesize a definition of equity that is tailored to the context of asset management. We will then ask people we have interviewed to give us feedback on the definition of equity in the context of asset management. After we have established a working definition, we will consider commonly used indicators such as socio-economic status as well other proxy indicators and how the measures fit the asset management context.

Finally, we plan to build on existing multi-criteria decision-making frameworks to propose ways that the various equity measuring indicators can be combined to inform decisions about assets.

Expected Outcomes

This project is expected to produce two specific outcomes.

First, we plan to comprehensively report on the findings of our literature review, interviews, and surveys. This reporting will be informative to other researchers and academics who are interested in studying the ways transportation asset management can contribute to social equity.

Furthermore, we expect this reporting to be useful to practitioners in local government who can learn how other agencies and jurisdictions are including considerations of social equity in their decision-making processes, and to other CBOs who may learn about policies to advocate for within their city or region.

Second, we will begin to operationalize the definition of equity we develop from the literature review, interviews, and surveys by identifying existing indicators that fit the definition and possibly proposing missing indicators that should be collected in the context of transportation asset management. We will also begin combining these indicators into a preliminary decision-making tool or strategy. The inequities present in American society are long standing and often maintained by complex interactions of identity, socioeconomic status and policy. Our initial effort is not expected produce a tool that will solve the problem of inequity, but primarily to serve as the basis for further research that will refine and enhance how social equity is incorporated into engineering decision-making. However, the tool will also be shared with the interview partners as a possible enhancement to their current practices.

Relevance to Strategic Goals

This proposal supports the achievement of several USDOT strategic goals. The primary goal addressed is State of Good Repair as this project seeks to support asset management decision making. Livable Communities is another key goal addressed by the proposal because the project focuses on supporting decision making in such a way as to enhance infrastructure's contribution to equity and social justice.

Educational Benefits

The funding provided by this project will be used to support the Masters or PhD research of a graduate student. Furthermore, the content identified through the literature review and interviews will serve as the basis for case studies about equity and social justice in civil engineering and construction that can be incorporated into the classes of the PIs and other faculty at CSU. Dr. Atadero has spent the last six years working to encourage engineering faculty to incorporate curriculum materials related to diversity, equity, and inclusion in required engineering coursework with the support of an NSF grant. She will build on her existing relationships with faculty to find appropriate courses for the content generated from this MPC project.

Technology Transfer

We will make use of multiple methods to disseminate the findings of our research and support the use of our findings by a variety of different stakeholders. We will publish and present our work in academic forums such as journal articles and conferences. We will follow-up with all agencies and organizations that participated in the interviews and surveys to share our findings regarding existing practices for considering social equity and our proposed decision-making framework. We will also offer an online webinar about project findings.

Work Plan

1. Literature review to define equity, assess existing practices and to identify subjects for future interviews and surveys. (Months 1-4)
2. Interviews with personnel from local governments, transportation agencies and community-based organizations working on transportation equity issues. (Months 3-6)
3. Survey of additional government and transportation agencies and community-based organizations. (Months 7-10)
4. Analyze interview and survey responses. (Months 6-12)
5. Define equity in the context of asset management (Month 12)

6. Identify indicators to support the definition of equity (Months 13-14)
7. Study the application of existing multi-criteria decision making tools to select an initial framework for consideration of social equity in asset management decision making. (Months 14-17)
8. Writing Final Report. (Months 18-21)

The project will begin with literature review and more general search practices to find example cases of equity-based decisions in transportation and cities and counties actively considering social equity in their processes, as well as formal academic definitions of equity. We will use the findings of the literature review to develop an interview protocol and a set of possible interviewees. We anticipate conducting interviews during months 3-6 of the project. Preliminary findings from the interviews will be used to develop a survey that will be sent to a broader range of local governments and community-based organizations during months 7-10 of the project. We will analyze interview and survey responses as they are collected and by the end of the first year we plan to have a definition for equity that fits the asset management context. In months 13 and 14 of the project we will identify indicators to fit the equity definition, and in months 14-17 we will investigate how the indicators can be used in existing multi-criteria decision-making frameworks. We will devote the final months of the project to writing the final project report and disseminating project findings.

Project Cost

Total Project Costs:	\$110,000
MPC Funds Requested:	\$ 50,000
Matching Funds:	\$ 60,000
Source of Matching Funds:	Colorado State University

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