THE EFFECT OF COVID-19 ON CONSTRUCTION LABOR PRODUCTIVITY AT THE NEW STUDENT HEALTH & WELLNESS CENTER

WALKABILITY IN CITIES AS A STRATEGY TO PROMOTE EQUITY

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By
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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

The ongoing coronavirus (COVID-19) pandemic has significantly affected the way people around the world work. Labor markets and supply chains around the world were severely altered as cases rose and governments issued required suspensions of operations. Some industries such as finance and technology were easily able to pivot operations to remote work (Organization for Economic Co-operation and Development, 2021; Lund et al., 2020). However, many industries were unable to transition to a full virtual working environment due to the nature of their work. The construction industry was one of those industries (Dalton & Groen, 2022).

Considered a critical industry by the CISA (2021), most construction could not stop during the pandemic unless a state's guidelines, such as New York, expressed that non-essential projects were to be suspended (New York State Government, 2020). This meant many workers were required to come to work in-person and risk becoming infected with COVID-19. The motivations as to why essential workers continued in-person work varies, but for some it may have been the financial strain that pandemic placed on their families (Rura, 2020) and for others it may have been out of social obligation (Phipps-Taylor & Shortell, 2016).

Following the initial world panic, the construction industry was able to somewhat stabilize due to the implementation of public health strategies and company specific guidelines. However, the industry began to suffer from materials delays & shortages which continue to plague projects to this day (AGC, 2022). My capstone project explores the challenges caused by the pandemic, specifically covering the impacts on labor productivity at the new Student Health and Wellness Center.

Pandemics, People, & Projects

The goal of the capstone project is to analyze the effect that COVID-19 had on construction labor productivity at the new Student Health and Wellness Center (SHWC) at the University of Virginia (UVA). The analysis will include examining project documentation such as monthly reports, requests for information (RFIs), and the project's manpower summary sheet. The team will also conduct an in-depth investigation into changes in the project's schedule over time using the scheduling software Oracle Primavera P6. The schedule analysis will consist of utilizing the initial May 18th 2019 schedule as the baseline when computing and comparing activity finish-date variance in more recent schedules. The results of the analysis will be finalized in a report that will be completed in December 2022. This report will serve as the foundation for a design and set of recommendations to better track labor productivity in the field even during major global events. The design portion of the project will be completed in Spring of 2023 and will entail developing the framework for a mobile app that construction professionals can use to track labor productivity on their projects. The capstone project's client is the construction firm Barton Malow who was in charge of building the SHWC. The course number for the capstone project is CE4991.

Urban Planning's Role in Promoting Social & Economic Equity

The unprecedented shift in labor caused by the pandemic also significantly changed the way people around the world live. Following the series of lockdowns in March of 2020, (Dunford et al., 2020) the summer brought people out of their homes and cities back to life. As people started interacting again, there were concerns about keeping COVID-19 case numbers down which led public health officials to implement social distancing measures that required

individuals to stay six feet apart (CDC, n.d.). This led to issues in urban environments which are primarily designed around vehicles forcing pedestrians to crowd on sidewalks as small as four feet (VDOT, 2018). To maintain social distancing measures, many city officials closed down entire streets for people to spread out and businesses to setup outdoor venues & seating (Lazo, 2020), (Diaz, 2020). This strategy of closing streets for people to walk and play has become popular and in some US cities, permanent (Schmidt, 2022). Walkability as a design characteristic of urban environments goes beyond being able to eat outside at a nice restaurant and walk down a boulevard without cars whizzing by. A walkable city can serve as a gateway to previously inaccessible services & opportunities for individuals of lower economic status.

Given the rise of car ownership in the 20th century (History.com, 2018) many existing cities in the United States of America (USA) have been designed or redesigned around automobiles. This car-centric design has lent itself to changing all aspects of daily life. Grocery stores, offices, and hospitals are spread out and require individuals to own a vehicle and drive to these locations for food, work, or medical care. This is a significant problem for people of lower economic status since car ownership & related expenses are second only to housing, making up 16.4% of average annual expenditure in the United States (CNBC, 2022; BLS, 2022). Owning a car essentially becomes the bridge to accessing most goods or services in the United States and anyone who doesn't own a vehicle is left behind.

A walkable city is the antithesis to this idea. In a walkable city, work, food, medical services, & more are all within immediate walking distance of a place of residence or at least close to public transportation systems. Accessing these essential goods & services becomes either free or significantly cheaper than it would be in a car-centric city due to reduced transportation costs (VTPI, 2016).

However, there is significant opposition to urban walkability, particularly from the auto industry. Walkability as defined by Baobeid, Koç, and Al-Ghamdi is the, "quality of which the built environment enables the mobility of pedestrians" (2021, p. 2). This typically means reducing car dependency or in some cases, removing cars out of cities altogether as in the city centers of Oslo, Norway and Madrid, Spain (Williams, 2019). This is financially disastrous for automakers whose business model is based around manufacturing, marketing, and selling vehicles to consumers. Using their immense size and resources, these entities have successfully lobbied for more spending on vehicular infrastructure and have pushed pedestrians out of public spaces (Mattioli et al. 2020).

Given the many stakeholders, conflicting viewpoints, and effects that car-centric infrastructure has on life in urban environments, the framework that is best suited to analyzing walkability and its relation with promoting social & economic equality is *technopolitics*. Technopolitics is the idea that technological systems are inherently political systems that exude their own agenda/influence on society (Winner 1980). The political ideology that the technological system possesses is often inherited from the creators of the technology. Given that walkability is a direct component of urban design and planning and that urban design is dictated by architects, engineers, and public officials, walkability is innately political since it is determined by people and is subject to their changing beliefs. Furthermore, the walkability of cities is tied to large physical elements such as sidewalks, pedestrian bridges, etc. and is inhibited by vehicular infrastructure such as highways, parking lots, etc. Regardless of changing stakeholders, these physical technologies will continue to exude their political influence until they are removed.

Research Question & Methods

To encourage more cities to embrace walkability as a means to promote social & economic equity, I ask the following questions. How has the COVID-19 pandemic accelerated the motivations to make urban environments more walkable and what are the best practices to do so? Which cities are adjusting to better accommodate pedestrians, what actions are they taking, and why are they doing it?

To answer these questions, I will perform a case study analysis of two walkable cities, Tokyo & Washington D.C., and contrast them with two cities that are deemed highly unwalkable, Houston and Las Vegas. The case study analysis will entail looking into how the age of the city effects walkability, how the city accommodates automobiles, what impacts does zoning policy have on walkability, and what specific elements are key to improving walkability. Supporting evidence will also be derived from interviews with various experts on walkability such as university architecture & engineering faculty.

As a civil engineer with an interest in urban planning and a passion for cities, this research topic is intimately tied to the type of work I want to pursue in my career. The United Nations Department of Economic and Social Affairs predicts that by 2050, 66% of people will live in urban environments (2018). These new residents will come from diverse backgrounds and possess unique skillsets, but they will share the demands for cities to be sustainable, equitable, and enjoyable to live in. The solutions to meeting these demands remains a puzzle, but walkability is certainly a piece. I want to be a part of the team of architects, engineers, and planners that puts the puzzle together and by furthering my knowledge on the topic of walkability, I may one day learn where it fits.

Conclusion

For the technical portion of the capstone project, my team and I will be analyzing the effect of COVID-19 on construction labor productivity at the new SHWC. Our findings will be finalized in a report that will be delivered in Fall of 2022. In the Spring of 2023, our team will utilize the report to develop a framework for a mobile app to better track labor productivity on construction projects.

For the STS portion of the research project, I will be investigating how to improve walkability in urban environments through a case study analysis of three domestic cities and one international city. This will result in a set of best practices that cities can follow to improve walkability, which will subsequently improve the lives of their residents by providing greater access to economic opportunities that car-centric cities deny.

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