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Detailed Project Outline: Impacts of A Proposed Subway Station in Red Hook, Brooklyn

Introduction

In 2005, New York voters passed a transportation bond issue by a vote of 55% approval and 45% disapproving to allow for dedicated funding for the construction of a subway line that would serve residents of the Upper East Side neighborhood of Manhattan. This new proposed line would have two phases, the first consisting of a subway line running along 2nd Avenue, making stops at 72nd Street, 86th Street, and 96th Street served by the Q train. This construction would cost 4.45 billion dollars. In contrast, Red Hook, Brooklyn is a low income, isolated neighborhood that desperately lacks public transportation service. Despite a growing population, funding for public transportation has been cut back. its population of 10,670 relies on just two MTA (Metropolitan Transit Authority) buses, the B61, and the B57.

The Upper East Side (UES) neighborhood is defined as the area North of East 59th Street to East 96th Street, from the East side of Central Park to the East River. The United States Census Bureau represents the UES by 31 individual census tracts. Of these 31 census tracts, the lowest median household income in 2013 was $71,113 (Census Tract 116 New York County, NY) and the highest was Census Tract 130, which has a median household income of $250,001, also the highest median income in New York City. This neighborhood is a historically wealthy one, its residents enjoy the benefits of well-funded, subsidized public projects such as road maintenance work, as well as a large network of public buses, and the IRT Lexington Avenue Line that consists of four individual subway routes.

The Red Hook neighborhood in Brooklyn does not enjoy the same public transit options or pedestrian maintenance privileges. Red Hook is a neighborhood shaped by the elevated interstate highway Brooklyn Queens Express. This highway, which was partially planned by Robert Moses, has had an extremely isolating effect on the neighborhood. Once a bustling port and economic hub for the City of New York, Red Hook has become cut off from the rest of the social and economic activity of the city. This has resulted in some of the lowest median household income in New York City, due to the combination of its extreme isolation by the BQE and the Holland Tunnel, and sparse public transportation services that would alleviate this isolation. The US census bureau measures Red Hook by three census tracts: Census Tract 85 has a median household income of $18,390, Census Tract 53 has a median household income of $67,054 and Census Tract 59 has a household income of $61,106. Despite a population of about 10,670, Red Hook is not served by a single subway line, the closest is Smith-9th St Station, which is about a 1-kilometer walk from the center point of Red Hook. All of these conditions make improving transportation infrastructure crucial for improving the general well-being of Red Hook residents. According to the New York City Department of Planning, "Red Hook is only peripherally served by the New York City Subway system" (NYCDOP). Furthermore, Red Hook has experienced severe budget cutbacks that have seen its bus system reduced from five bus routes to two. This is especially concerning considering that the NYCDOP's Red Hook

Transportation Study found that in 2000, over 90% of the households in Census Tract 85 has no access to a car.

        This leads to the presentation of this project research question, which is as follows: Would a new subway station located in the underserved Brooklyn neighborhood of Red Hook, be more beneficial - in terms of enhancing the mobility of a vulnerable population through better offering of public transportation - than the newly constructed subway line on the Upper East Side of Manhattan? Our hypothesis is that a new subway station located in Red Hook will be more beneficial than the newly built subway line on the Upper East Side of Manhattan, in terms of enhancing vulnerable populations mobility.

Datasets
NYC Open Data --
Provided By: Metropolitan Transit Authority
Date Created: 4/10/13
Date Made Public: 6/28/13
Downloads: 153,697

New York City Basemap --
Projection: NAD_1983_StatePlane_New_York_Long_Island_FIPS_3104_Feet
Provided By:Department of Information Technology & Telecommunications (DoITT)
Date Created: 9/6/16

US Census Data --
Geography: Census 2000 TIGER/Line files, U.S. Geological Survey (USGS)
Author: American Community Survey (ACS), County Business Patterns (CBP)
Date Created: ACS 2013, CBP 2012
Provided By: US Census Bureau, US Department of Commerce

Methodology
1. Download and extract US Census data, specifically Census tracts 83, 53, 59, 116 and 130 as shapefiles into the appropriate folder
2. Download and extract NYC Open Data "City Subway Stations" shapefile provided by Metropolitan Transportation Authority into the same folder as in step 1
3. Download and extract New York City basemap shapefile into the same folder as in steps 1&2
4. Add the US Census tracts 53, 59, 83, 116 and 130 shapefiles into ArcMaps 10.6
5. Add the New York City basemap shapefile into ArcMaps 10.6
6. Add the City Subway Stations shapefile into ArcMaps 10.6
7. Create layer of overlay of census tracts 53, 59, 83, 116 and 130 over the basemap shapefile

8. Project all shapefiles to NAD-83 UTM Zone 18T
9. Use the data management tool feature to point to convert census tracts polygons 53, 59 and 83 into points
10. Perform the following query search in census tract 53's attribute table: median annual income < $32,402 + no car ownership + welfare benefit recipient
11. Perform the following query search in census tract 59's attribute table: median annual income < $32,402 + no car ownership + welfare benefit recipient
12. Perform the following query search in census tract 83's attribute table: median annual income < $32,402 + no car ownership + welfare benefit recipient
13. Intersect all the selected points in census tracts 53, 59 and 83
    a. This will create a new layer
14. Go to the properties tab of the new layer showing the points for median annual income, car ownership and welfare recipient, and make these into a choropleth interval format
15. Activate Network Analyst Extension and Network Analyst Toolbar
16. Find 3 dissemination blocks or clusters of high occurrence of the aforementioned statistical variables, while avoiding areas near bus stops
17. Create a 400 meter buffer around each of these 3 clusters
    a. Transit Capacity and Quality Service Manual stated that 400 meters is roughly the maximum distance people are willing to travel to reach a local public transit station
18. Use allocation location analytic tools to determine the most optimal location for a new subway station from the 3 clusters
    a. Cross-compare the number of incidences found in each of buffer to find the one with the highest incidence -- that will be the optimal subway station location
19. Place a 400-meter buffer around the new subway station built in Upper East Side of Manhattan.
    a. This will create a new layer
20. Perform the same query search for the area within the 400-meter buffer
    a. Create new shapefile from the selected points
21. Cross-compare the number of incidences found in the 400-meter buffer for the new subway station in Upper East Side Manhattan against the number of incidences found in the 400-meter buffer surrounding the recently chosen optimal location for a new subway station in Red Hook

Expected Results
The expected result from the spatial analysis carried out in the project is that the hypothesis will be confirmed. Construction of a new subway station in Red Hook will lead to increased social

and economic mobility for its residents. Because of their lack of access to vehicles and low income, residents of Red Hook to heavily use the new public transportation options. Although ridership of the newly constructed 2nd Ave Line in UES has been high, their higher median income allows them to access other transit options, including private vehicles, cabs, and ride-hail services. A new subway station in Red Hook would have a greater economic and social impact on its residents, and thus would have been a better investment by the NYC government than the 2nd Ave Line that serves an already privileged community.

References

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