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Implementing HSR Infrastructure In The United States To Improve Sustainable Development

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Abstract

The United States has a need to improve sustainable development; which impacts the economy, society, and environment. High speed rail (HSR) funding and infrastructure can help the United States become much more sustainable within cities and surrounding areas. However, the United States has been trailing behind other countries when it comes to supporting HSRs. (Chakrabarti and Foster, 2013) (See Figure 1) The funding appropriated to mass transit systems have been disproportionately allocated to other mass transportation infrastructures and maintenance; and particularly under funding to HSRs. (Chakrabarti and Foster, 2013) Since there is a lack of interest in having HSRs in the United States, the research conducted is used to highlight the importance and benefits of having HSRs. Most studies that have been conducted in other countries explained the benefits from HSRs that impacted capital gain, societal statuses, or environmental factors; however they never focused on all three sustainable development factors at the same time. The conclusions from the articles state that HSRs have produced overall improved capital gain to cities and nearby towns. (Bracaglia et al., 2019, Yang et al., 2019) They also have much less land use and CO_2 emission, when compared to other mass transit systems; and have provided transportation convenience to surrounding areas outside the cities (D'Alfonso et al., 2016, Herala, 2003, Robertson, 2018) (See Figure 2-3). With these findings the United States can implement either a HSR infrastructure program in the east coast or set up an agency that can oversee the infrastructure and maintenance of HSRs to confidently boost sustainable development benefits. (See Figure 4)

Introduction

The importance of how the United States deals with density, societal well-being, economy, and environment has been a recent driving factor and crucial on how infrastructure development needs to be handled in the United States. The U.S. has been notorious to help fund many different transportation infrastructure and development. Chakrabarti mentions how in 2012 the United States has spent billions on airway, highway, and other modes of transportation, however, one particular mass transit system the United States that is relatively underfunded is high speed rails (HSR).(Chakrabarti and Foster 2013) Many Asian and European countries have built multiple HSR systems in the past several years and have conducted multiple research about their uses. The different research articles show how HSRs both impacted the environment and socio-economic relationships within their populations. While certain research focused on many multiple factors, such as the research conducted in China; they investigated HSR traffic flow, average speed, distance, locality benefits, economic impacts, etc. (Yang et al., 2019). Other studies focused on actual direct economic or environmental impacts. Regarding environmental factors that were looked at, several studies have statistically measured the CO_2 levels of both air traffic emissions and compared them with the CO_2 emissions from HSRs. (Robertson, 2016, D'Alfonso et al., 2015) Another study concluded that highway infrastructure land use was detrimental to both land usage and biodiversity, which also noted how HSRs helped minimize those negative environmental factors. (Herala, 2003). The United States has had non-existent HSR systems in place since 2012 and has been trailing behind other countries' HSR infrastructure developments. (Chakrabarti and Foster 2013) In order for the United States to have sustainable development, they need to investigate improving cities and the surrounding area mass transit systems. As shown in the Bracaglia and Nickelsburg study, the U.S. would have to properly plan how to execute the business and government regulation to make sure to gain the most economic, societal, and environmental benefits to assure the maximum number of citizens are using these HSRs. (Nickelsburg et al., 2018, Bracaglia et al., 2019)

Methodology

The models shown were created using multiple programs such as Microsoft Excel, Adobe Photoshop, Adobe InDesign, and Adobe Illustrator. The graphs and figures were generated using the information on the research articles that highlights multiple points on the environment, government spending, and CO_2 emissions. (Chakrabarti and Foster 2013, Robertson, 2016, D'Alfonso et al., 2015)(See Figures 1-3) The graphs and charts were also placed in Adobe InDesign and altered slightly to assure formatting was acceptable. The high speed rail image with the eastern U.S. map (See Figure 4) was generated by using Adobe Photoshop with blending techniques and also using the tools within Adobe Photoshop to show potential high speed rail lines construction (highlighted in different colors) that could be used to connect major city to major city within the east coast. Proposed HSR projects would include a major rail line connecting Portland, Maine all the way down the eastern coastline to Orlando, Florida that would be known as the East Coastline Red Line (ECRL). (See Figure 4) Another rail line from Washington, D.C. to Atlanta, Georgia; this would be known as the Southern Connect Green Line (SCGL). (See Figure 4) The final rail line would connect Newark, New Jersey to Chicago, Illinois and would be called East-to-West Blue Line (EWBL). (See Figure 4)

Results

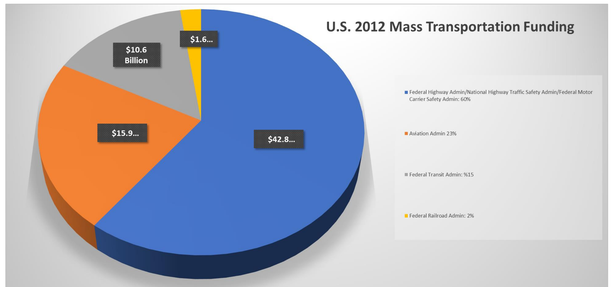

Figure 1: This figure shows the funding the U.S. spent on 2012 and the relative percentages between each departments .(Chakrabarti and Foster 2013)

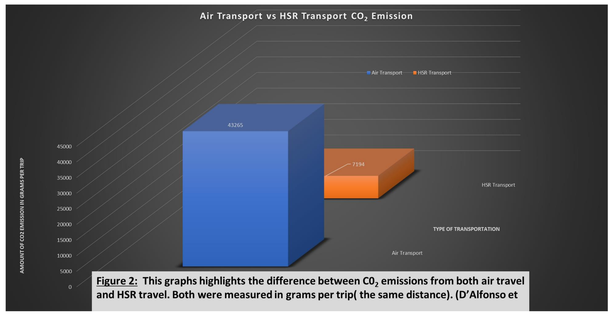

Figure 2: This graphs highlights the difference between CO_2 emissions from both air travel and HSR travel. Both were measured in grams per trip(the same distance). (D'Alfonso et

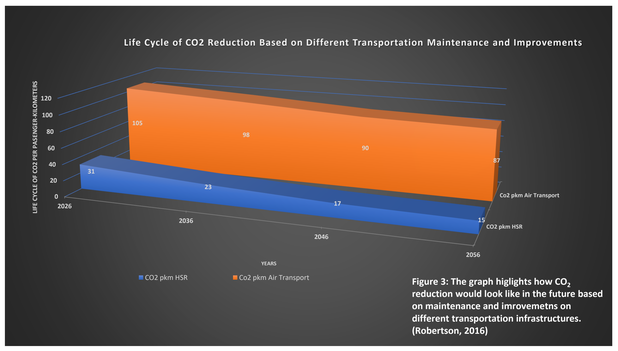

Figure 3: The graph higlights how CO_2 reduction would look like in the future based on maintenance and imrovemetns on different transportation infrastructures. (Robertson, 2016)

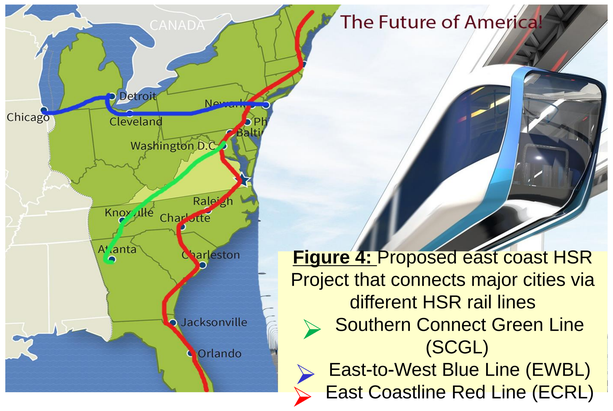

Figure 4: Proposed east coast HSR Project that connects major cities via different HSR rail lines
- Southern Connect Green Line (SCGL)
- East-to-West Blue Line (EWBL)
- East Coastline Red Line (ECRL)

Discussion / Conclusion

Implementing a new overhaul of a high speed rail system could prove challenging in the United States. Several countries, from China to Spain, have already set aside funds and time to construct hundreds of miles on high speed rails (HSRs), while the United States falls short on HSR infrastructure and funding. (Bracaglia et al., 2019, Yang et al., 2019, Chakrabarti and Foster, 2013) (See Figure 1). The United States still relies on primarily airway and highway transportation. (Chakrabarti and Foster, 2013) It has been shown that the time of travel and the CO_2 are both short and has been reduced when compared to other modes of transportation. (D'Alfonso et al., 2015, Robertson, 2016) (See Figure 2 and Figure 3). Not only has HSRs been proven to positively impact society and the environment; they have also shown to greatly improve the economy to cities that are located near HSRs and helped maintain the cost of homes and rented locales low in these locations. (Yang et al., 2019, Nickelsburg et al., 2018). While there have been a lot of benefits from having HSRs as a mode of mass transportation, there also have been several issues that would need to be addressed when trying to build HSR infrastructures. Several studies have found that funding HSRs can be expensive so they typically search for companies and investors to help fund these HSR projects, however, it has to be noted that caution is needed to assure monopolization of companies doesn't occur when handling the profiting of HSRs (Bracaglia et al., 2019, Nickelsburg et al., 2019). Another issue that could arise is knowing where to build the HSR infrastructures. As stated in Herala's study, land use needs to be taken into consideration and careful planning to make sure HSRs are placed and used in the most effective/convenient way possible without damaging the local environment. (Herala, 2003) The project that is proposed provides an idea of where and how to build the HSR railway systems. Planning needs to be done carefully to assure the safety of the land and the environment isn't heavily compromised. Construction would also have to be taken in parts or separate rail lines, as proposed, so that way funding can be appropriately administered. (See Figure 4) It would be expensive to construct these rails, so it would require participation from various investors, companies, and the government to assure profits from HSR remain fair and maintenance for the HSRs are overseen by government regulations. Once the HSR lines are constructed, the U.S. will begin to notice changes in both the economy and environment and work its way to improving its own sustainable development.

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