Impacts of BRT Introduction on Local Economy in a Developing City: Case Study in Brasilia
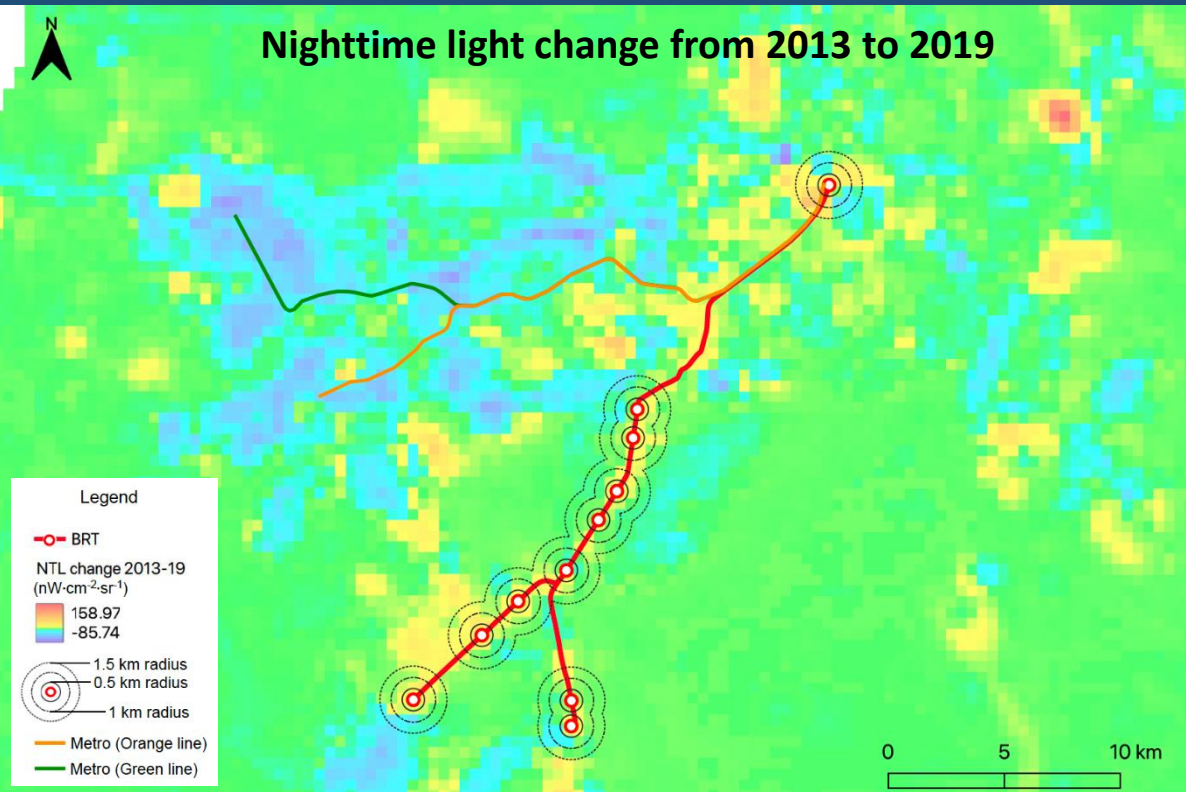
発展途上都市における BRT 導入の地域経済への影響：
ブラジリアの事例分析

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Nighttime light change from 2013 to 2019

Legend
- BRT
- NTL change 2013-19 (nW·cm⁻²·sr⁻¹): 158.97 / -85.74
- 1.5 km radius / 0.5 km radius / 1 km radius
- Metro (Orange line)
- Metro (Green line)

0 5 10 km

1 Background

Bus rapid transit (BRT)
- High-quality bus-based transit system.
- Improvement of productivity for low- and middle-income people

BRT in Brasilia

Heterogeneity in BRT's economic impacts
- Economic impacts of BRT in some cities were significant while those in other cities were insignificant.

Research questions

> Under what conditions does the BRT introduction have positive economic impacts in a developing city?

2 Goals

This study aims to:
(1) Estimate the regional economic impacts of BRT introduction;
(2) Identify factors affecting the local economic impacts of BRT implementation; and
(3) Discuss the implications for the introduction of BRT in developing cities.

- **Data**: Annual time series data of global VIIRS nighttime light (2013-2019); Interviews with local experts and shop owners
- **Assumption**: Observed nighttime light intensity (NLI) is correlated with GDP (Doll et al., 2005)

3 Method

Estimation of local economy's impact
Matched difference-in-differences analysis
- Treatment group: 159 grids within 1km of BRT stations (Baseline model)
- Control group: 159 grids in the entire Brasilia other than the treatment group

Identification of factors
- Stratified analyses
- Interviews with local experts and shop owners

> **Discussion on policy implications**

4 Results

Empirical results revealed that an introduction of BRT has significantly positive impacts on NLI:
- In areas within 1km and 0.5km from BRT stations.

They also found that an introduction of BRT has more positive impacts on NLI:
- in areas with lower economic level than those with higher level by 0.396;
- in areas within 500m from local bus stop than outside by 0.300.

Interviews unveiled that:
- main BRT users are low income;
- access to BRT remains poor in some areas due to insufficient local bus networks.

Impact of BRT introduction on increase in NLI (nW·cm⁻²·sr⁻¹)

Baseline: 1km from stations	0.594*
Treat: 0.5km from stations	1.201**
Treat: 1.5km from stations	0.218

Impact of BRT introduction on increase in NLI (nW·cm⁻²·sr⁻¹)

Baseline	0.594*
Lower half of NLI in 2013	0.924***
Upper half of NLI in 2013	0.528
Within 500m from local bus stop	0.675 ·
Outside 500m from local bus stop	0.375 ·

***: p<0.001, **: p<0.01*: p<0.05, ·: p<0.1

Interview with experts

5 Conclusions

- Introduction of BRT has positive impacts on local economy.
- The impacts are larger in areas with lower economic level and local bus stop nearby.
- Impacts of BRT introduction are uplifted by availability of local bus service.

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