



**THE RELATIONSHIP BETWEEN  
TRANSPORT, HOUSING, AND  
URBAN FORM:  
AFFORDABILITY OF TRANSPORT AND  
HOUSING IN INDONESIA**

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# Background

- Transport and housing costs are interrelated due to their substantial share in household budget
- Households make trade-offs between these two costs
- Combined housing + transport or *location affordability* is suggested as a more comprehensive measure

# Contributions

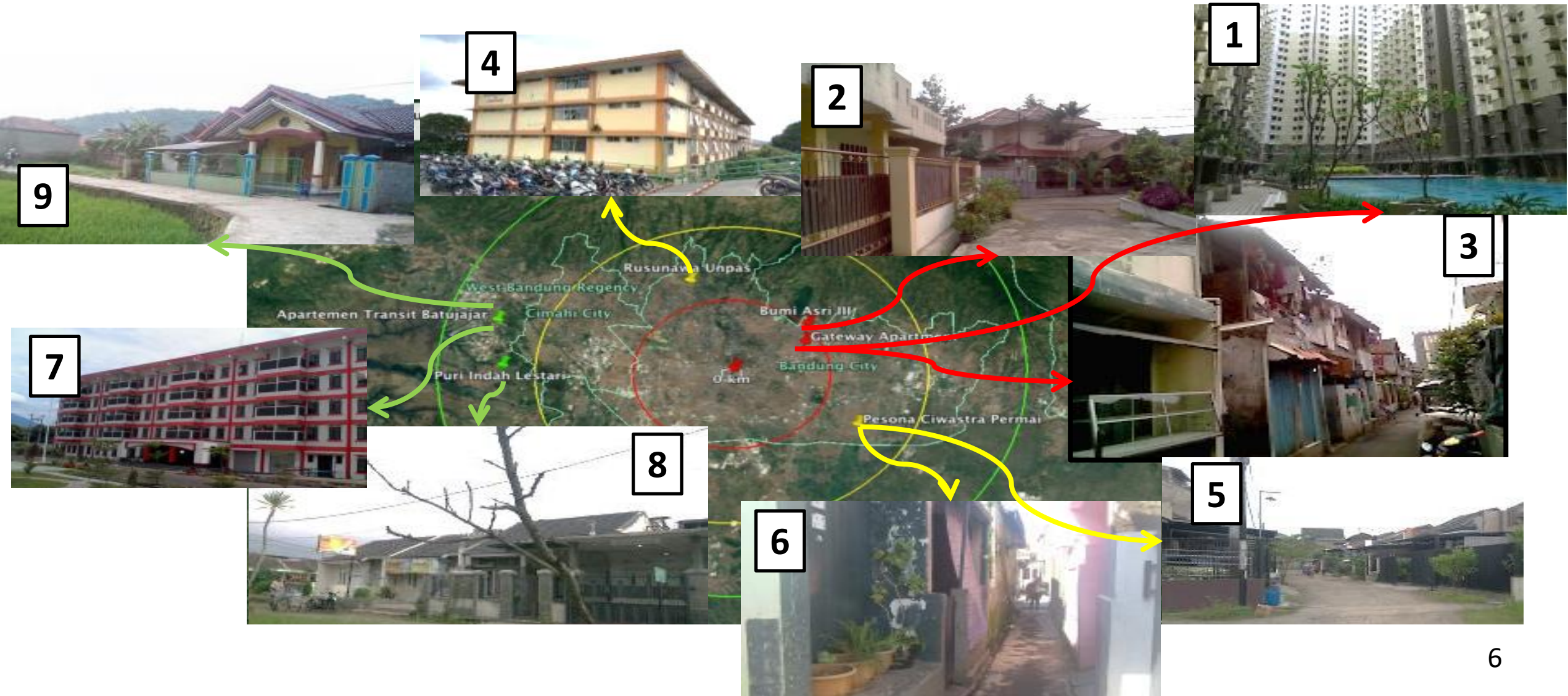
- Explore relationships between transport, housing and urban form by housing type and by locational setting, in the Bandung Metropolitan Area (BMA), Indonesia.
- Propose an alternative method to measure affordability using the interval data envelopment analysis (DEA) method.

Time	May – June 2016
Method	Questionnaire In person
Sampling	Systematic Random Sampling 405 HH from 9 residential locations
Targeted Survey Sites	medium and low income group residential areas
Questions	Demographic Housing Module (house type, ownership and costs) Transport Module (private vehicle and public transport costs) Income Module (occupation and income)

## The Survey

Selected Survey Sites	Residential Density	Distance from City Centre	Dwelling Type	Form	Development Type
<b>Location 1 (Gateway Apartment)</b>	High	0-5 km (city core)	Apartment	High Rise	Formal
<b>Location 2 (Bumi Asri III)</b>	High	0-5 km (city core)	Non-Apartment	Low Rise	Formal
<b>Location 3 (Cicadas)</b>	High	0-5 km (city core)	Non-Apartment	Low Rise	Informal
<b>Location 4 (Rusunawa Unpas)</b>	Medium	>5-10 km (mid-suburban)	Apartment	Medium Rise	Formal
<b>Location 5 (Pesona Ciwastra Permai)</b>	Medium	>5-10 km (mid-suburban)	Non-Apartment	Low Rise	Formal
<b>Location 6 (Rancasawo)</b>	Medium	>5-10 km (mid-suburban)	Non-Apartment	Low Rise	Informal
<b>Location 7 (Rusunawa Batujajar)</b>	Low	>10 km (outer suburban)	Apartment	Medium Rise	Formal
<b>Location 8 (Puri Indah Lestari)</b>	Low	>10 km (outer suburban)	Non-Apartment	Low Rise	Formal
<b>Location 9 (Batujajar Timur)</b>	Low	>10 km (outer suburban)	Non-Apartment	Low Rise	Informal

# The Survey



# The Variables

## Transport Costs

Monthly expenses on fuel, parking fees, maintenance cost and insurance

## Housing Costs

Monthly expensed on rent or “owner equivalent rent”, electricity, water and gas rates, body corporate or neighbourhood maintenance fees, property tax

## Household Income

Monthly household net-income (after-tax income)

Method:

- Interval Data Envelopment Analysis (Interval DEA)
- Value ranges between 0 (not affordable) and 1 (affordable)
- DMUs: Location 1 – 9

Housing Affordability Model:

Output variable : HH net income

Input variable:

- Monthly housing costs

Transport Affordability Model:

Output variable: HH net income

Input variables:

- Monthly private transport costs
- Monthly public transport costs

Combined Housing and Transport Affordability Model:

Output variable: HH net income

Input variables:

- Monthly housing costs
- Monthly private transport costs
- Monthly public transport costs

Minimum Affordability Scenario

Minimum values of the output variable and maximum values of the input variables

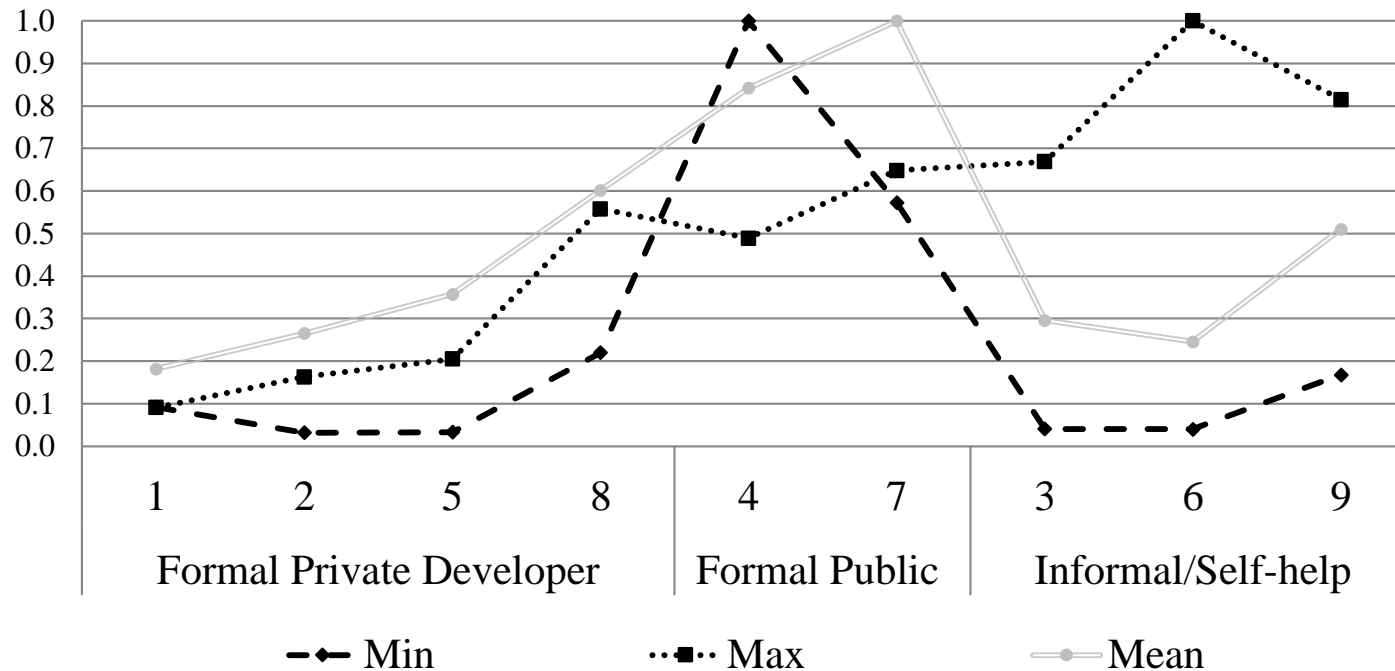
Maximum Affordability Scenario

Maximum values of the output variable and minimum values of the input variables



## Minimum, maximum, and average score for housing affordability

**Affordability Scores**



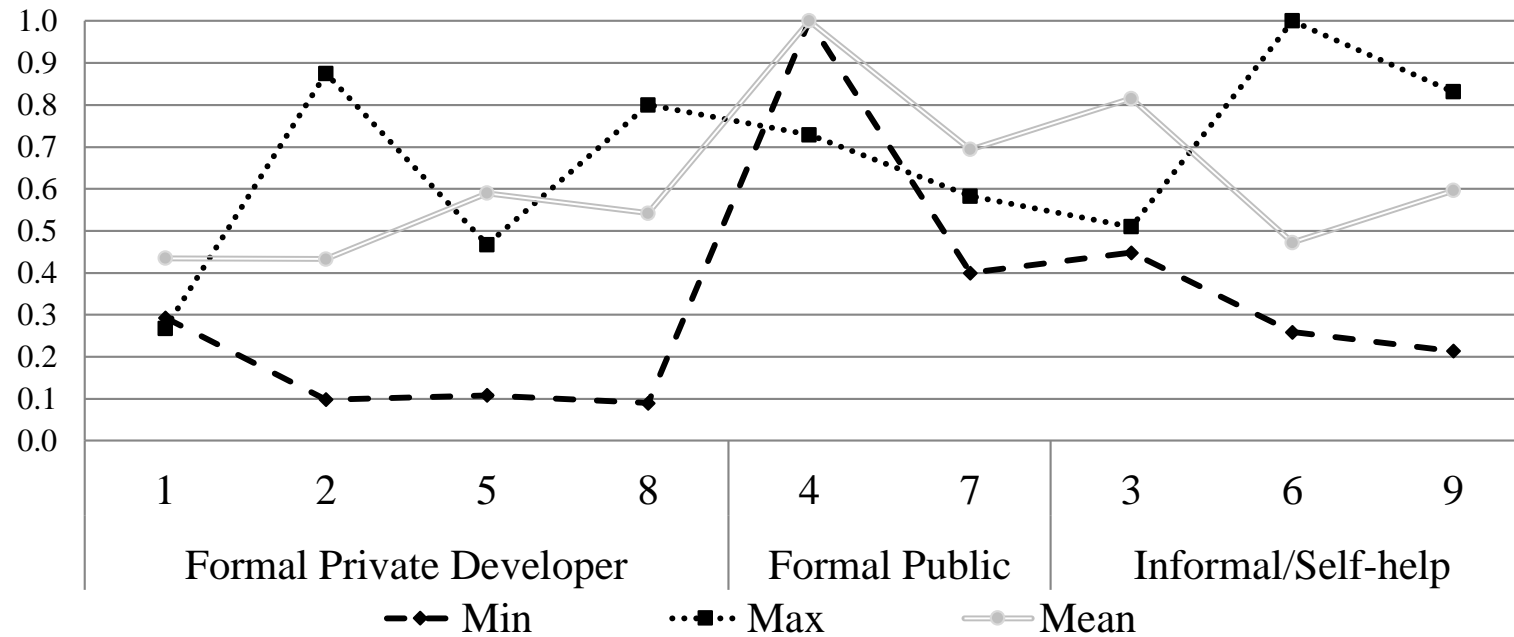
- 1: City Core Apartment
- 2: City Core Non-apartment
- 3: City Core Informal Housing
- 4: Mid Suburb Rental Housing
- 5: Mid Suburb Non-apartment
- 6: Mid Suburb Informal Housing
- 7: Outer Suburb Rental Housing
- 8: Outer Suburb Non-apartment
- 9: Outer Suburb Informal Housing

**Residential Locations**

# The Results

Minimum, maximum, and average score for transport affordability

Affordability Scores



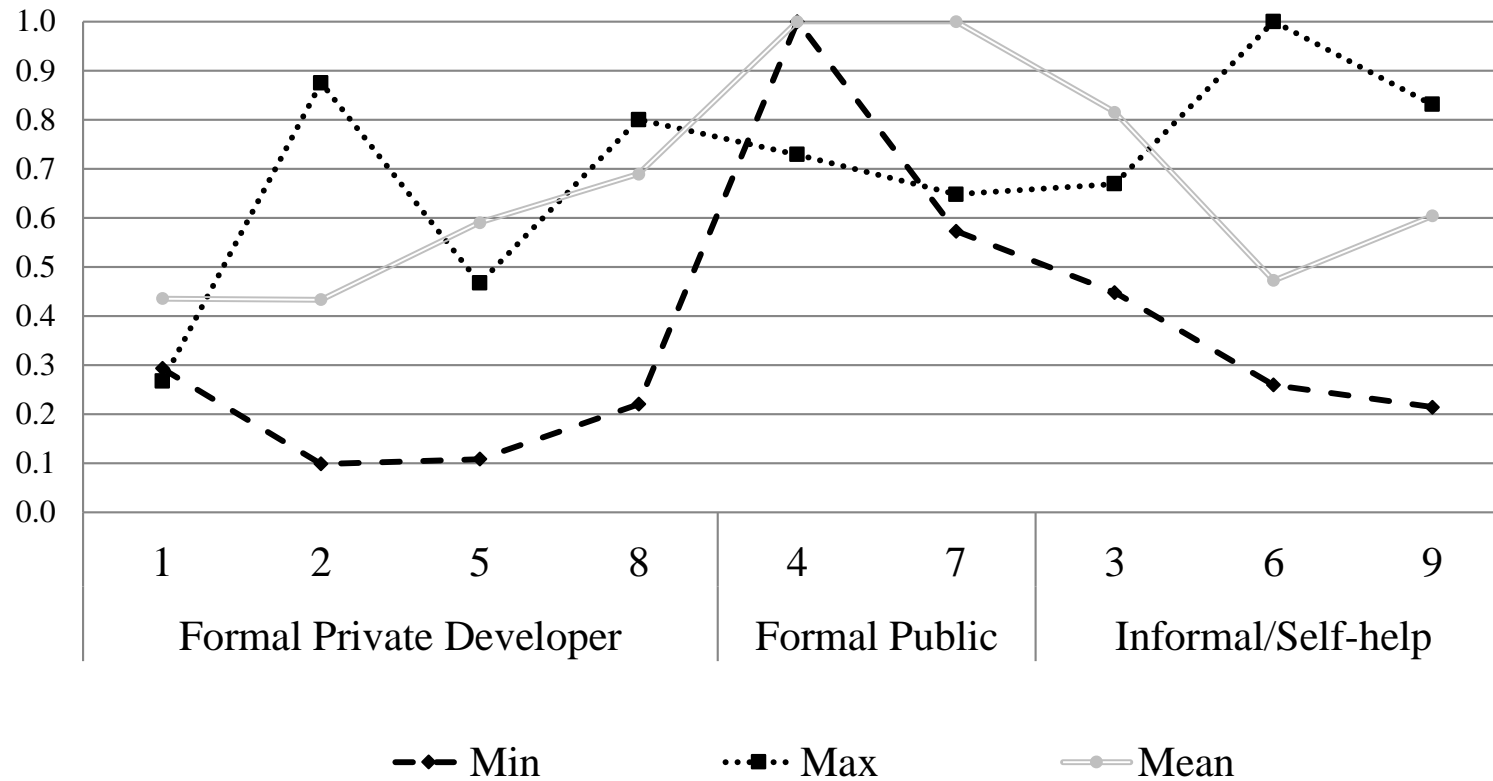
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Residential Locations

# The Results

Minimum, maximum, and average score for transport affordability

## Affordability Scores



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## Residential Locations

# Policy Implications

## ■ Housing Sector

- Strong support for public rental housing program targeting low-income groups. Currently only 1.5% of national government budget allocated to public housing
- Policy initiatives to acknowledge and support the informal or self-help housing: legalisation and quality improvement

## ■ Transport Sector

- Transit-oriented development (TOD)
- Reliable and affordable mass public transport (busway and commuter line)
- Walking and cycling friendly environment

# Conclusion

- Incorporating transport costs into affordability measures can reveal true housing affordability
- The overall affordability differs based on housing type and income related behaviour
- Interval DEA modelling as an alternative measurement method of H+T affordability:
  - Requires no pre-assumed weight, which might incur errors
  - Range of values of 0 to 1 relatively easy to interpret
  - Maximum and minimum values capture the data variability problem and provide greater flexibility in target setting to improve affordability

# Conclusion

- Limitations and future research:
  - incorporating household size, household structure, value of time and travel behaviour in the calculation of transport costs,
  - integrating the role of attitudes in selecting residential location
  - Household expenditure approach for income variable