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The LILT model: its structure and application

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The LILT model

- **LILT** = **L**eeds **I**ntegrated **L**and use **T**ransport model
- Developed from 1971 onwards
- Aggregate model
- Originally based on The Model of Metropolis developed in 1960s by Ira Lowry
- Includes explicit representation of transport processes
- Works over time, typically at 5-yearly intervals
- Designed to be used with existing data, for example, from the Census of Population, as far as possible

The land-use transport hierarchy within the LILT model

Short-term effects

- Modal choice for trips

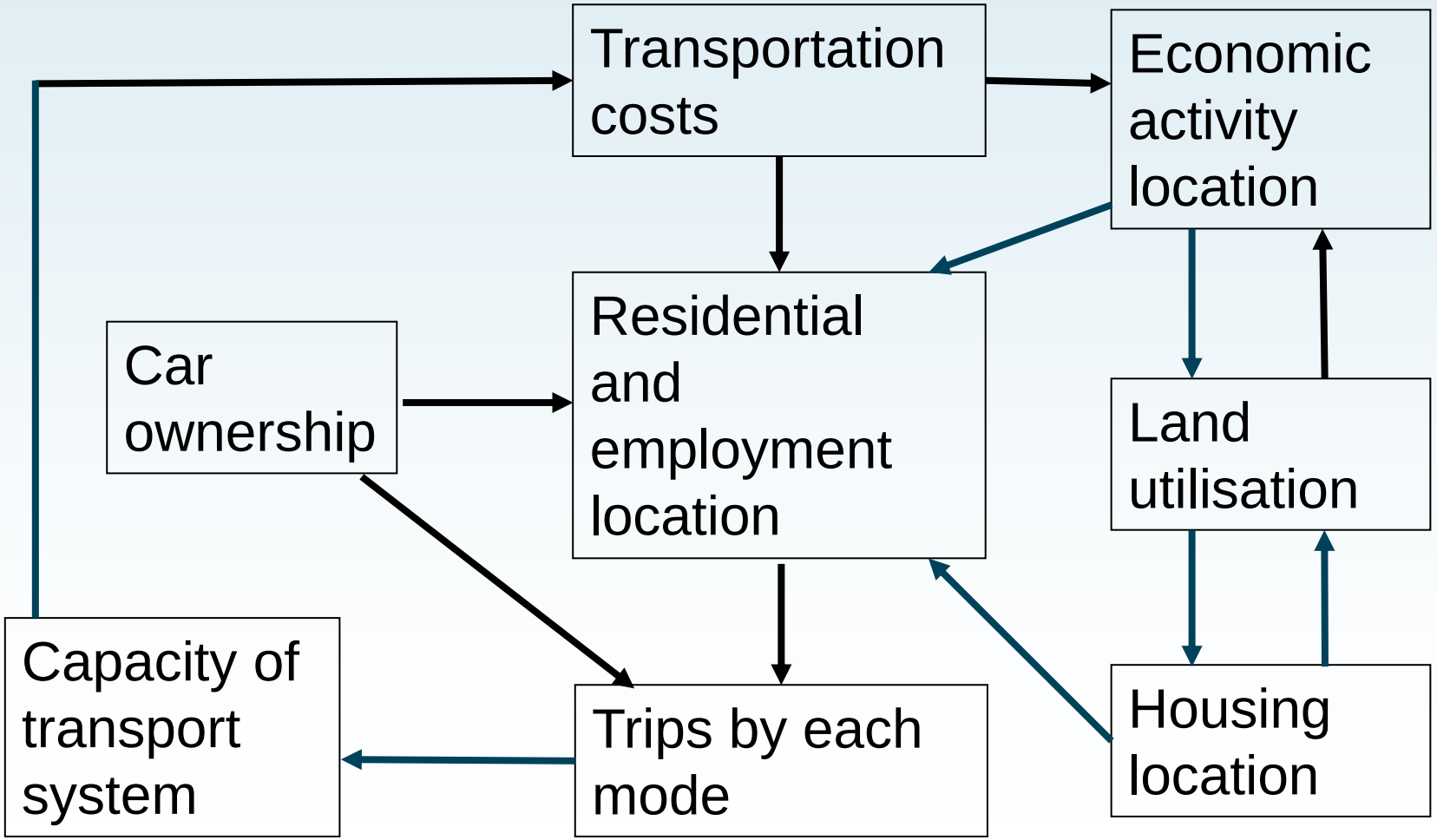
Medium-term effects

- Car ownership
- Choice of residential location (where to live)
- Choice of employment location (where to work)

Long-term effects

- Location of housing
- Location of economic activity (= jobs)
- Land utilisation

Structure of the LILT model



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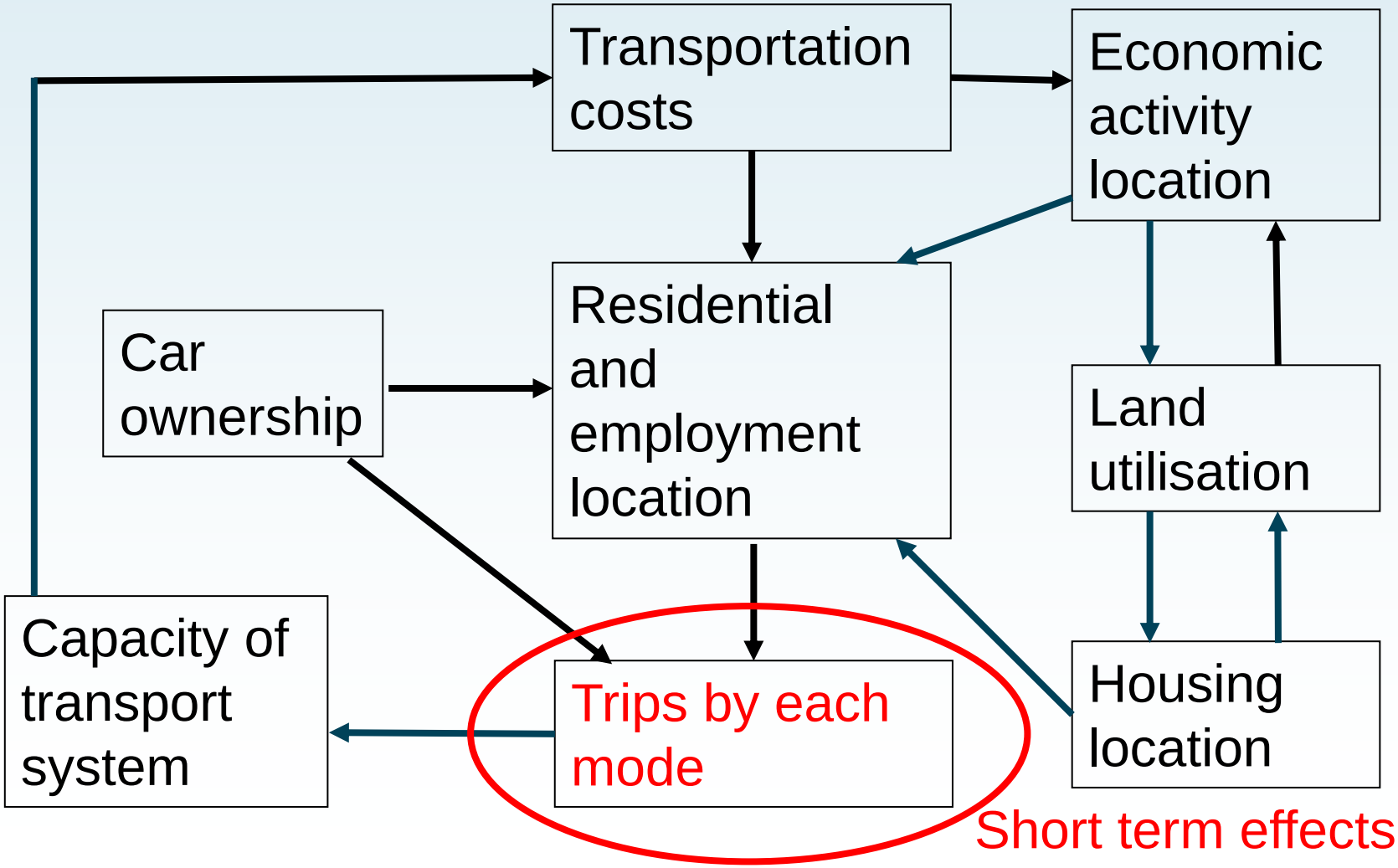

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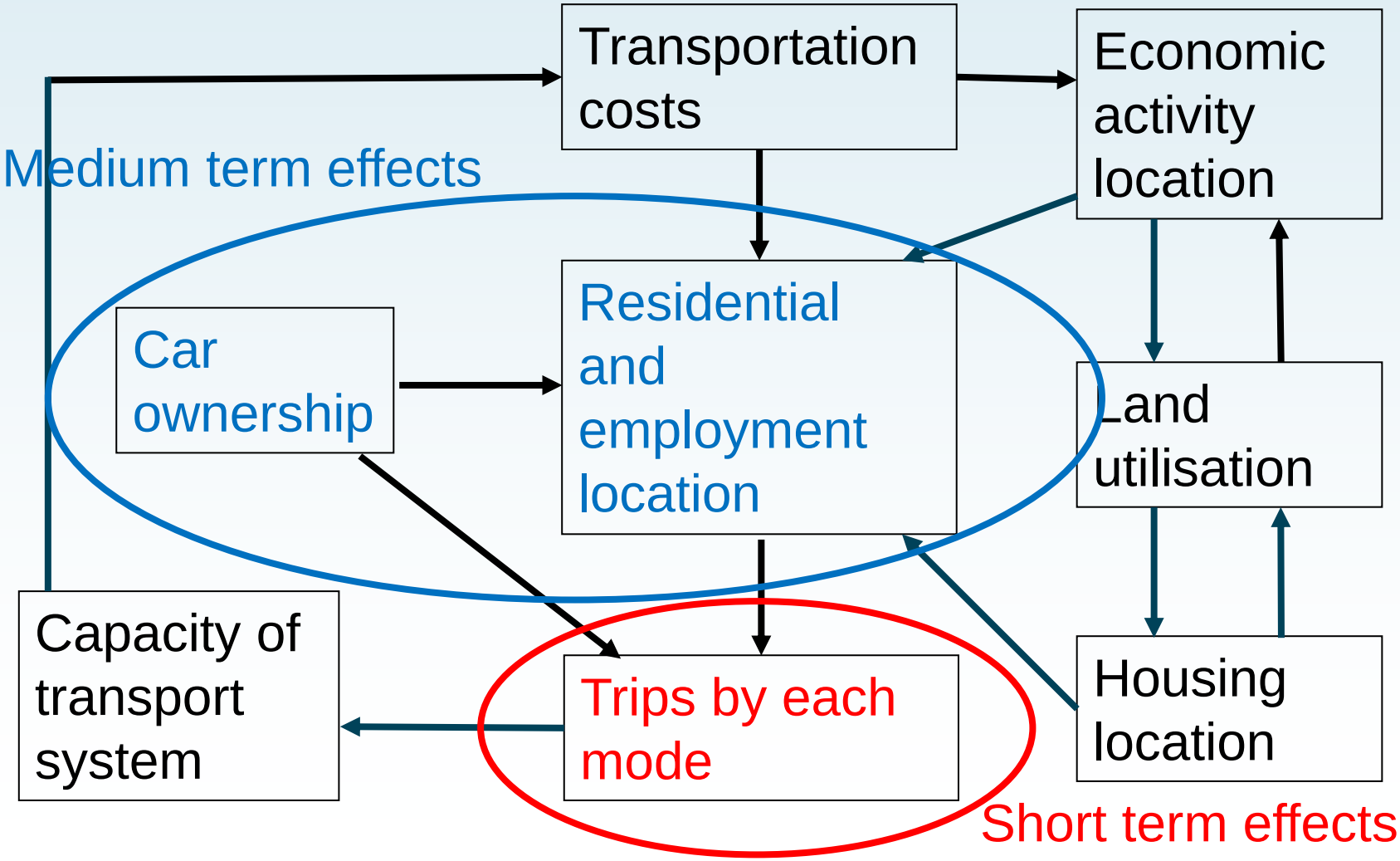

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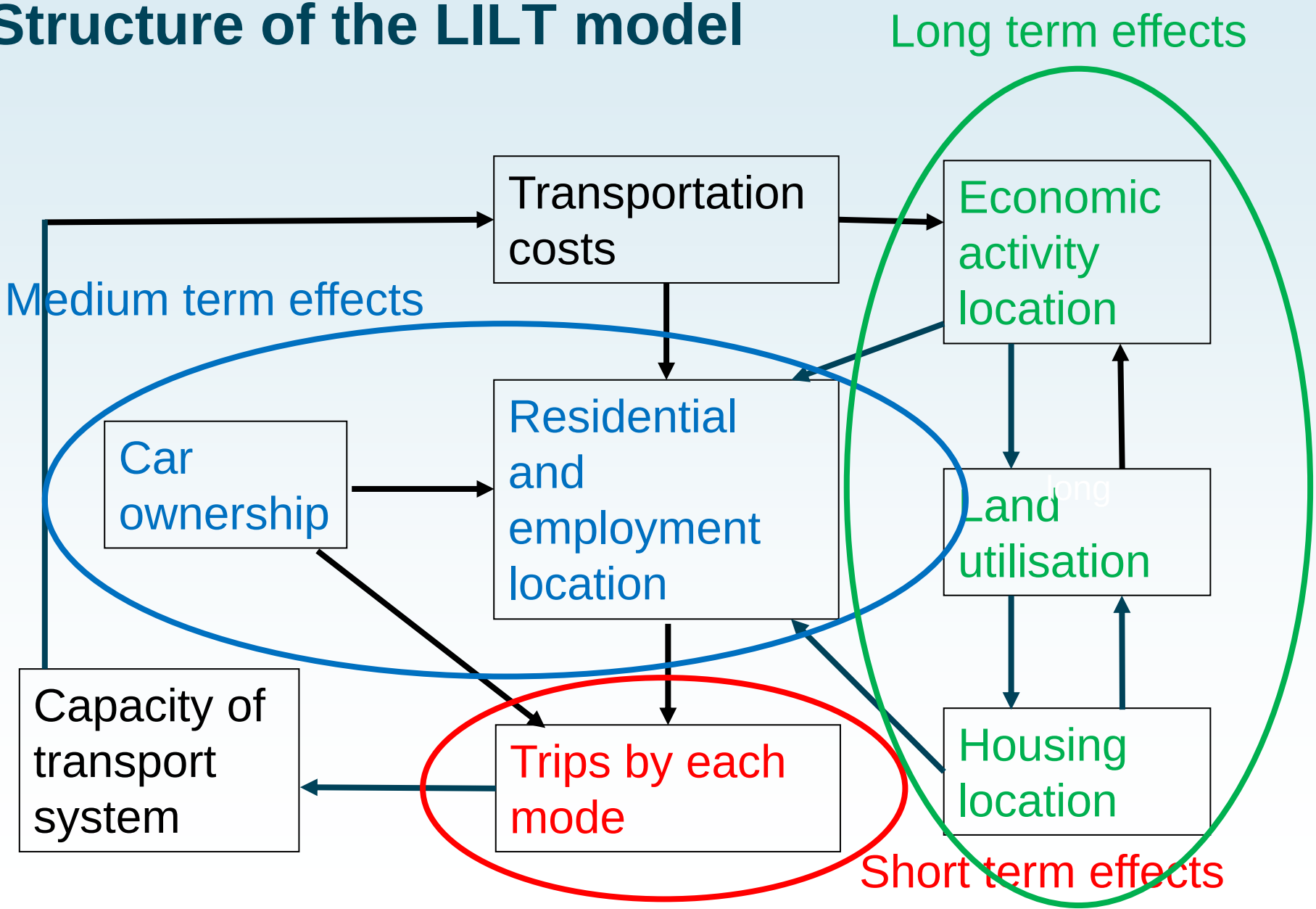

Categorisation within LILT used in the application to Leeds

Three employment categories were modelled:

- Primary for example agricultural jobs
- Secondary such as manufacturing, transport and communications
- Tertiary such as shops and services

Population was divided into three socio-economic groups

Three modes of travel (car, public transport and walking) were represented.

Calibration of the LILT model

Calibration used maximum likelihood techniques

A typical LILT calibration involved using

- An observed journey to work matrix (disaggregated by SEG and car ownership group);
- An observed retail trip matrix
- The housing location pattern
- The primary and secondary economic activity pattern

Applications of the LILT model

- Leeds – original study area
- ISGLUTI study – Leeds, Dortmund, Tokyo
- SE England – rail infrastructure impact studies

Application of LILT to Leeds

Leeds is a city with a population of about 750,000.

Industrial city which prospered in the 19th century in the industrial revolution based on the wool industry.

Policies tested:

- Increasing the cost of petrol
- Increasing bus fares
- Transport policies to address inner-city problems, including making short public transport trips cheaper and removing parking charges

Use of LILT in the ISGLUTI study

- ISGLUTI = International Study Group on Land Use Transport Interaction
- Nine LUTI models were run using about 40 policy tests
- As well as being applied to Leeds, LILT was applied to
  - Dortmund in Germany for comparison with the IRPUD microsimulation model
  - Tokyo in Japan for comparison with the CALUTAS model

Application of LILT model to proposed rail infrastructure in South East England

- In 1989: Jubilee Line Extension to Docklands on the London Underground which opened in 2000.
- In 1992-93: HS1 – the impact of commuter trains on the high speed rail link from the Channel Tunnel to London, especially the location of intermediate stations. Line opened in 2007.
- In 1994: CrossRail – this is the new east-west rail high-capacity rail link under London. LILT was used to look at the impact on rail demand on other rail corridors into London. Expected to open in 2020.

Summing up

- LILT was initially developed in the 1970s to examine the impacts of transport policies on cities, taking into account changes in land use patterns.
- It was used in the ISGLUTI study and performed well in terms of being applied to a large number of policies and to three cities.
- It was used to demonstrate the impact of major rail infrastructure projects, particularly examining the impacts on commuting patterns.
- It has not been used for a number of years.