The LILT model: its structure and application

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The LILT model

- **LILT = Leeds Integrated Land use Transport 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

- Transportation costs
- Residential and employment location
- Trips by each mode
- Car ownership
- Capacity of transport system
- Economic activity location
- Land utilisation
- Housing location
Structure of the LILT model

Transportation costs

Residential and employment location

Trips by each mode

Economic activity location

Land utilisation

Housing location

Car ownership

Capacity of transport system

Short term effects
Structure of the LILT model

Medium term effects

- Car ownership
- Capacity of transport system

Transportation costs

Residential and employment location

Economic activity location

Land and utilisation

Housing location

Trips by each mode

Short term effects
Structure of the LILT model

- Transportation costs
- Residential and employment location
- Short term effects
  - Car ownership
  - Capacity of transport system
  - Trips by each mode
- Medium term effects
- Economic activity location
- Land utilisation
- Housing location
- Long term effects

Short term effects

Medium term effects

Long term effects
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 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.