Activity location and mobility costs
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XIX Convegno Annuale e Seminario Scientifico della Società Italiana Docenti di Trasporti

“La riduzione delle risorse nel settore del trasporto collettivo: effetti economici, sociali, ambientali e possibili soluzioni”

Padova 18, 19 Ottobre 2012
18 October 2012 – Auditorium Centro Culturale “Altinate San Gaetano”

Registration (8:00 – 9:30)

Opening (9:30 – 10:00) SIDT President

Session 1 (10:00 – 11:00) Transportation Planning
Traffic basins of Calabria region: methodology and application
PAVONE G., Chià G., Filella A., Meduri G., Trecozzi M.R.
LUTI and DEA for simulation and evaluation in urban transport planning
Musolino G., RINDONE C.
Strategies to implement a transportation-efficient regional development
Cappelli A., Libardo A., NOCERA S.
Public engagement for planning and design transportation systems: tools and experiences
Cascetta E., PAGLIARA F.
Towards lean transportation infrastructures: defining value and identifying MUDA
Cascetta E., DA GIAU A., Furlan A., Macchion L., Vinelli A., ZANOTTO M., Binotto F., Fioratti M.

Session 2 (11:00 – 12:00) Public Transport
Key factors affecting rail service quality. A decision tree approach
DE ONA R., Eboli L., Mazzulla G.
The local public transport in Italy: state, prospects and international comparisons
Cascetta E., PAPOLA A.
Application aspects of the tram-train system. The case of Brescia
Maternini G., RICCARDI S., Cadei M.
Classification of urban settlements and public transport improvement
Carrese S., SALES A.
Change to survive: public transport and new technologies for Europe global competition
CAPPELLI A., Libardo A., Nocera S.

Session 3 (12:00 – 12:50) Travel Behaviour
On the attributes and influencing factors of end-users quality perceptions in urban transport: an exploratory analysis
BARABINO B., Corona G., Deiana E.
User empowerment and advanced public transport solutions
FILIPPI F.
An experimental analysis of the propensity for voluntary travel behavior changes
Melião I., SANJUST B., Sottili E.
The value of aesthetics in railway stations: a quantitative analysis of perceived quality for travellers
Cascetta E., CARTENI A.

Buffet (12:50 – 13:45)

Session 4 (13:45 – 14:35) Network Design
Models and algorithms for solving the combined assignment-control problem
GALLO M., D’Acierno L.
Stability of traffic lights as dynamic switching systems and sensitivity of the performances
Di Febbraro A., SACCO N.
Experimental analysis of the performance of an urban road system: an innovative approach using data envelopment analysis
FANCELLO G., Uccheddu B., Fadda P.
Stochastic equilibrium assignment with variable demand: two variables solution algorithm performance and effects of choice models
CANTARELLA G.E., de Luca S., Di Gangi M., Di Pace R.
Session 5 (14:35 – 15:35) Sustainable Mobility
A dynamic simulation based model for optimal fleet repositioning in bike-sharing systems
CAGGIANI L., Ottomanelli M., Sassanelli D.
"ELEbici@Roma": an innovative project for sustainable mobility
Carrese S., CIAFFI F.
Strategies to achieve an "ecological airport urbanism": the Venice airport case
CIPRIANI L.
An innovative car-sharing system for sustainable mobility in urban area
Gattuso D., Pietrafesa M., Pudano A., RESTUCCIA A.
Driving behaviour, slope and vehicle load factor impacts on bus fuel consumption: real case application in the city of Rome
Carrese S., LA SPADA S.

Coffee break (15:45 – 16:00)

Session 6 (15:50 – 16:50) Logistics I
City logistics planning and urban freight transport modelling: recent trends
NUZZOLO A., Comi A.
ITS technologies for logistics. A state of the art
Gattuso D., PELLICANÒ D.S.
Trip chain behaviour of commercial vehicles in urban areas: the Parma case study
TOZZI M., Corazza M.V., Musso A.
Statistics for simulation of logistic platform
Gattuso D., CASSONE G.C.
A DSS for the assessment of city logistics measures
Nuzzolo A., Crisalli U., COMI A., Rosati L.

Session 7 (16:50 – 17:25) Logistics II
A model for reserved lanes design for freight vehicles
Polimeni A., VITETTA A.
Mode choice models for the assessment of italian freight transport policies
Nuzzolo A., CRISALLI U., Comi A., Rosati L., Panico F.
Indicators for city logistics
Musolino G., OTTOMANELLI M.

Session 8 (17:25 – 18:00) Travel Demand I
Evaluation of travel demand impacts in the case of rail system failures
D'ACIENNO L., Gallo M., Montella B., Placido A.
Road transport elasticity: how fuel price changes can affect individual traffic demand
Musso A., PICCIONI C., Tozzi M., Godard G., Lapeyre A., Papandreou K.
An analysis of a suburban rail demand in the city of Naples
Biggiero L., CORAPI G.
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Session 9 (14:15 – 15:15) Accessibility
Bus rapid transit vs regular bus system: comparing the impact on urban accessibility by public transport  
Capri S., Ignaccolo M., INTURRI G., Rubulotta E.  
A tool for an evaluation of reachability of an airport area  
CONCA A., Papa F., Rubino S., Vignolo M.G.  
Activity location and mobility costs  
Nuzzolo A., Coppola P., PAPA E.  
New measures of accessibility based on perceived opportunities  
Cascetta E., Carteni A., MONTANINO M.  
Assessing a general method to enhance airport passenger accessibility and resources optimization  
Gualandi N., MANTECCHINI L., Paganelli F., Tagliazucchi C.

Session 10 (15.15 – 15.50) System Vulnerability
Ranking links in a road transport network: an application of Spearman’s correlation coefficient  
ANGELINI S., Danesi A., Rossi G., RUPI F.  
Travel time forecasting for vehicle routing: the case of urban evacuation  
MUSOLINO G., Polimeni A., Vitetta A.  
Demand simulation and planning for evacuation conditions  
RUSSO F., Rindone C., Chià G.

Coffee break (15:50 – 16:05)

Session 11 (16.05 – 16.30) System Efficiency
Energy efficient speed profiles for suburban train operation: a simulation model  
DE MARTINIS V., Gallo M.  
Effects of full automation on technical-economic efficiency in metro systems  
ANTOGNOLI M., Ricci S.  
A model for transit design with choice of vehicle type and energy charging system  
FUSCO G., Alessandrini A., Cipriani E., Colombaroni C., Messina G., Valentini M.P.

Session 12 (16:30 – 16:55) Road Intersections Analysis
Warning sound to affect perceived speed in approaching roundabout: experiments with a driving simulator  
Rossi R., GASTALDI M., Biondi F., Mulatti C.  
The analysis of roundabouts through visibility  
MUSSONE L.  
Optimal setting of traffic signals through the artificial bee colony algorithm  
Dell’Orco M., Başkan Ö., MARINELLI M.

Session 13 (16:55 – 17:20) Transportation System Monitoring
Annual average daily traffic estimation from seasonal traffic counts  
Gastaldi M., Rossi R., GECCHELE G., Della Lucia L.  
A new classification of Italian ports based on the value added concept  
Lupi M., FARINA A.

Session 14 (17:20 – 17:55) Travel Demand II
Experimental analysis of day-to-day route choice dynamics in a three-link network without information provision  
MENEGUZZER C., Olivieri A.  
Influence of information on users’ behaviour: a day-to-day model for route choice updating  
DE MAIO M.L., Vitetta A., Watling D.  
The value of en-route information on the accessibility to concurrent transit system services  
GORI S., Nigro M.L., Mannini L.

Closure (17.55) SIDT President
1 INTRODUCTION

The paper fits into the general themes of land use - transport planning (Nuzzolo and Coppola, 2008a and 2008b) and accessibility (Geurs and van Wee 2004) in urban areas. It's widely recognized in academia the need for integration between mobility and land use policies in accordance with the objectives of environmental sustainability and quality of life in urban areas (Nuzzolo and Coppola, 2007; te Brömmelstroet and Bertolini, 2011). Furthermore, in recent years travel behaviours are changing in urban areas due to the increase in oil prices, the recession of Western economies, the resulting lack of financial resources for public transport subsidies. For this reasons, technicians and scientists are trying to find solutions in the short and long term to make existing transport system more efficient. In this sense the search for integrated solutions including systems engineering, transport and urban planning is a priority not only in the scientific debate but also in the operative field. Despite an extensive literature on the land use-transport interaction has been produced, simple tools for land - use transport integrated planning are not as much used; in particular tools that can support the choices of location of new activities in the definition of urban or regional plans are not widely applied (Hull et al. 2012).

According to this premise, the goal of the work is to develop a tool to support the choices of activities location, which is based on accessibility and transport costs indicators. Assuming that one of the goal of integrated land use – transport planning is the minimization of generalized transportation costs (Nuzzolo and Coppola, 2010), in compliance with the objectives of environmental sustainability and quality of life, the tool computes the “access cost” of activities, providing an estimation in monetary terms of the advantages and disadvantages of locating an activity in a particular zone of the urban area; the tool provides
also thematic GIS maps of territorial activity access cost, which identify the areas where access costs of located activity are lower.

The article is structured into three parts. The first part offers an overview of the literature on land use - transport planning, accessibility, and activity access cost, while the second part describes the methodology for estimating access cost to activities; in the third part we propose an application of the methodology to the metropolitan area of Rome and some conclusion remarks.

2 METHODOLOGY: ESTIMATING THE ACTIVITY ACCESS COST

The methodology for estimating the “access cost” to activities starts from the consideration that an activity entails itself a mobility cost in relation to the trips it generates. These trips are related to the commuting of the activity’s workers (work trips) and to the flows of users attracted by this activity; for example, a shop attracts trips for purchase purpose. To calculate these costs, the activity demand flows to the zone in question, for various available transportation modes, the flows on the network arcs and its related times and travel costs (transport costs for users) can be estimated through a transportation system model (Cascetta, 2009).

The flows on the network links allow also an estimation of the transport external costs, which constitute an important component of the access cost, connected to:
- Environmental pollution
- Noise pollution
- Energy consumption
- Road accidents.

There are other cost components which are related to the management costs of the transportation system, such as maintenance (and construction) of infrastructures or public transport subsidies; these costs are typically funded by transport agencies and local administrations.

The sum of the three cost components described (transport costs for users, external costs for the community and costs for agencies and administrations) of a zone in a given sector (for example shopping) provide the average access cost to that activity. The access cost will be different for each activity category (shopping, education, services, etc..) because each activity attracts specific trips flows, from different origin zones and with different modal share.

Several types of cost indicators can be calculated, as for example the marginal activity access cost, considering just a single new employee located in the zone and constant the distribution of other activities and the supply of transport services and infrastructure, independently to the location of a new employee in the area. Dividing by the number of employees of an area in a given sector, the average access cost (cost per employee) to the activity of that sector is obtained.
The "access cost" allows the analysis and identification of some critical issues related to the activities locations in the study area and can provide useful information to guide the land use planning process.

2.1 The application in the metropolitan area of Rome

The article proposes the application of the methodology to the metropolitan area of Rome, estimating the access cost to new development areas (centralities) located in different suburban areas, as defined by the new Master Plan of Rome with the aim of decongesting the central area and of creating new functional centers. The measure of the access cost for new activities in “centralities” areas is useful to validate or not the location choices proposed by the Master Plan, from an access cost point of view.

3 CONCLUSIONS

The work provides a useful tool to assess the location choices of new activities, estimating the access cost to urban functions using the existing transport supply. This indicator, which is proportional to the spatial impedance to reach an activity and that takes into account the different cost components (internal and external costs), provides a useful indicator for identifying the best location of a new activity in the study area, to which correspond a suitable access cost. The application illustrates the usefulness of the tool for land use –transport planning processes.

REFERENCES


te Brömmelstroet M. Bertolini L. (2010) Integrating land use and transport knowledge in strategy-making *Transportation* 37, pp.85–104