

Logistic as a Factor to Improve the Integrated Transport and Environmentally Acceptable

Msc. Eng. Eli Vyshka

“Aleksander Moisiu” University, Professional Studies Faculty,
Department of Mechanic and Transport, Durres, Albania.
E- mail: eli_vyshka@yahoo.it

Prof. As. Dr. Asllan Hajderi

“Aleksander Moisiu” University, Professional Studies Faculty,
Department of Mechanic and Transport, Durres, Albania.
E-mail: ashajderi@yahoo.com

Abstract: The work presented takes in consideration the impact of policies (master) to the state in management of existing infrastructure and the combination of types of transport with the aim of making the environmentally friendly transportation with the climate and resources. The purpose of this document is to provide a summary of transport modeling methodology and results provided to traffic. The tool used for this project was the city of Tirana, calibrated according to the base year 2007. The model was developed for conducting regional transportation analysis. Material argues that spatial distribution of social networking in combination with the establishment of housing choices will be a major factor in increasing the distinct travel miles. The conceptual framework for the day-to-day dynamics is based on the rhythmic patterns for the need of accumulation and their satisfaction through activities and long-terms projects. Model, through cargo transport (number of vehicles is expected to grow about 9 times) of data on population (which is expected to grow by 57%), economic development and travel behavior predicts the development of traffic conditions in the future (which yields 37% higher). These projections are a tool to be used by planners to identify types of transport investments that will be more effective in reducing congestion, improving travel times, as well as meeting the objectives of the Metropolitan Transportation Plan (MTP).

Key words: efficient logistics systems, combined transport

1. A general understanding on transportation demand

This writing highlights two sections in search of background in transport planning:

- The structure of travelers social networks in connection with their basic mobility choices
- The day-to-day dynamics of activity generation.

Transport planning claims to understand the dynamics of the systems it analyses: transport infrastructures and travel behaviors. A closer look reveals that certain dynamics are well understood, others less so, some not at all. The reasons for these partial understandings are the previous and current professional tasks of the discipline and the preferred modeling tools.

In this paper, we cannot set out a theory for everything; we cannot even provide a description of every substantial dynamic process in the transport system.

We want to highlight two specific areas against the background of the overall economic changes of the last 20 years. Which to draw for the two main issues it wants to address:

- 1) Changes in the spatial distributions of social network and
- 2) Intrapersonal dynamics of daily travel behavior.

Transport planning describes specific behavior over time and specific locations. It uses the parameters estimated from it to envisage the changes that can occur with perhaps a new structure of overhead costs, new levels of population distribution, and activity opportunities. Stabilities observed in the average travel time among the years have provided general change in society and economic conditions.

In the first part of this writing, we will inform about the scale of those changes mentioned above by highlighting a small number of key developments.

In the second part, we will discuss likely impacts of the anticipated further changes on the physical distribution of travelers' social networks.

Finally, **in the third part**, we will outline a framework for the daily dynamics of travel behavior which translate these bigger changes into daily practice.

The key development of the last 20 years is the translation of the accumulated differences between productivity and population growth into mass consumption.

Dynamics of development of production and population growth for the region of Tirana during the years 1990-2010 is shown in Fig. 1 (<http://www.instat.gov.al/>).

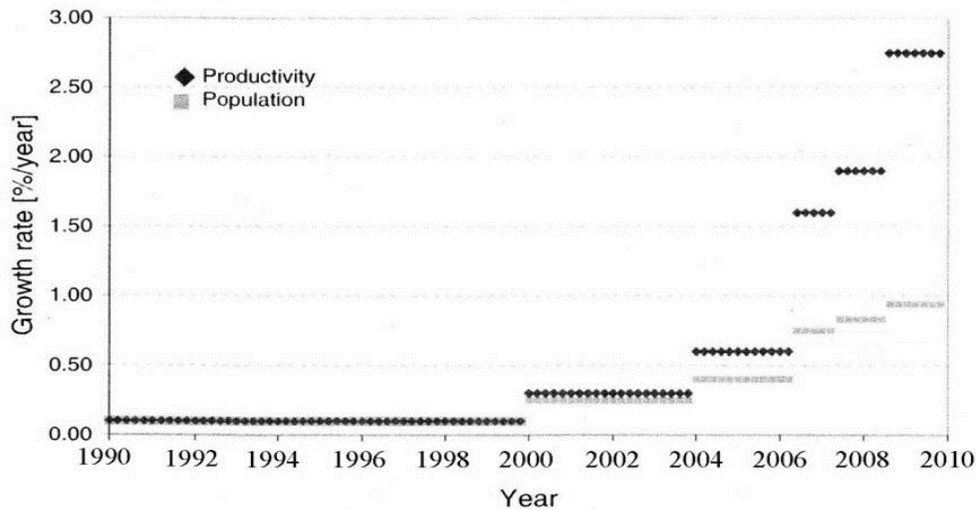


Figure 1: Productivity and population growth rates since 1990-2010

Obviously the product and the population by the year 2000, is almost unchanged. Differences arise after 2004 with a 1.5 times increase for the years 2004-2006. For period the 2006-2008 growing differences with 3 times, and 4 times in 2008-2010 in favor of productivity. Key sectors in this process were housing and travel demand. In housing, the trend to smaller households combined with the use of cheaper suburban land made, for example, about 50 m² available for each Swiss by 2000¹, an increase of 66% since 1950 (Rumley, 1984)

In terms of travel demand, Albanians, like most other populations of the BE area, have increased the use of personal vehicles, which have taken possession. Dynamics of receipt of the patent and vehicle ownership by age group and sex is shown in Figure 2.

Usefulness of using the vehicle from its owner is impressive for all age groups. It is clear that certain younger age segments (to some extent) do not have the resource, which delays the universality of access², but virtually everyone has access to a parallel technology, telephony.

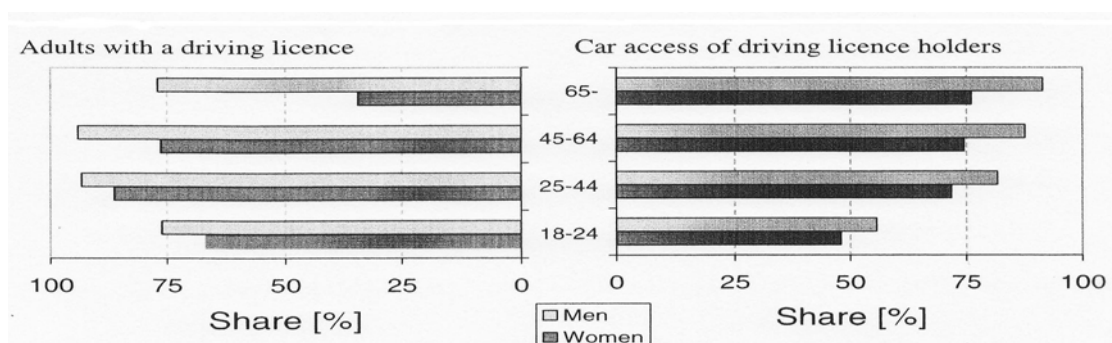


Figure 2: Access to motorized travel in Tirana by age 2007

¹ The numbers for Germany are substantially lower: 41m²/person in 1998 (Statistisches Bundesamt, 2000) and substantially higher for US metropolitan areas: 66 m²/person (Kahn, 2001)

² The population of license holders without access would be an interesting subject of in-depth study.

Device with driving license brings the device later owned vehicle. This brings the ease of motion, increase speed and reduce travel time. So, the dynamic development of the travel distance, speed of movement and travel time for the city of Tirana for the years 1990-2010 (<http://www.ital.gov.al>) shown in Figure 3.

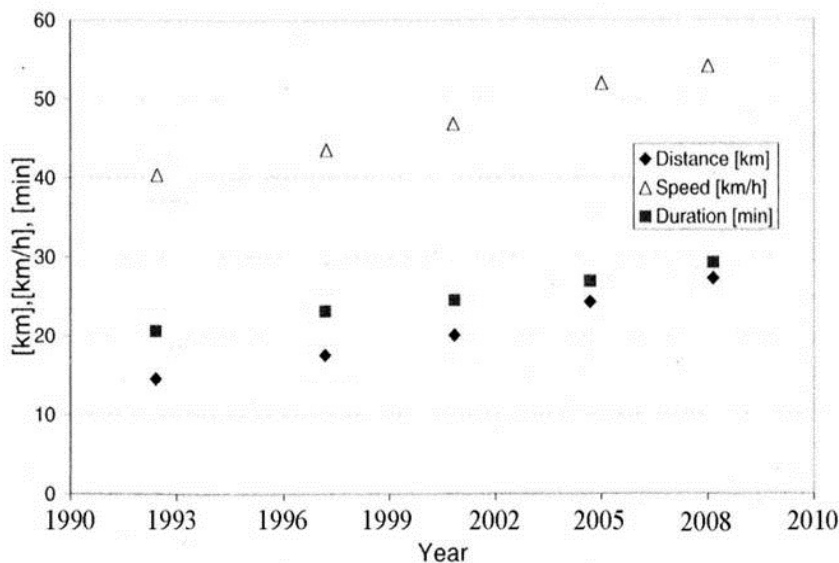


Figure 3: Dynamics of change of distance, speed and travel time

The approval for a car is the main reason for the increase in the share of travel and communication.

The motorized, connected, and spatially dispersed population of today with its access to cheap travel must have different patterns of work and sociability than the population of 20 years ago. Spatial distribution of population and use of car has increased the number of free trips and travel distances.

The next section will discuss one element of this change: likely changes in spatial structures of the overall populations' social networks.

Activity space and social space

Daily life revolves around friends, family, work, school and commerce³. The distribution in space of these commitments/opportunities shapes the activity space determines a person's consumption of transport services, obviously including those which are produced by the person walking or driving.

If we accept this idea, then increasing distances between those poles of a person's activity system has long reaching and permanent effects: a dynamic which cannot be reserved quickly, given the investments people make into their work, their family, and friendships.

Based on general trends regarding **spatial structure of social networks** can be taken into account the following:

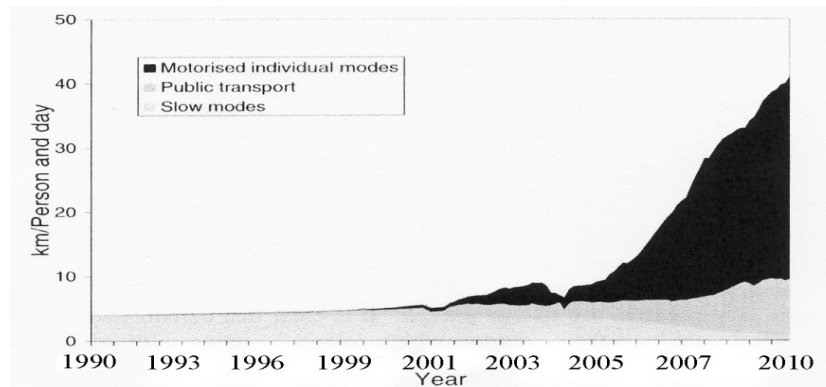
- ❖ The spatial distribution of social network members will be more extensive than in the past, i.e. the average distance between the houses will be increased.
- ❖ Average social networks will be less coherent, i.e. fewer people will share multiple connections today in the past.
- ❖ The memberships will also match less in spatial terms, i.e. proximity with their residential locations and activity spaces.

The number of kilometers describe from each person per day, according to the methods of transportation used by individual car, public transport and slow (pedestrian) for the years 1990-2010 is shown in Figure 4.

³ Alternatively visit Wellmann website at www.chass.utoronto.ca/~wellman, 1996 for further information.

As shown the use of pedestrian travel in 2010 is much reduced, while individual car use has increased over 3 times in comparison with public transport.

In terms of transport these trends and assumptions imply longer distances when people want to meet face-to-face. The current unwillingness to replace face-to-face contact might fade over time, but currently most analysts agree that such contacts are required to build up confidence for on-going, productive relationships, in both private and work domains^{4,5} (Axhausen, 2002).



Distance is the first perspective from a transport point of view, but frequency is the second. Again, the literature is silent on this question, but one can discuss for the following assumptions:

- People have a larger set of active contacts today than in the past
- The contacts are spread across more social networks than in the past
- The maintenance of each contact requires more effort at the same level of quality than in the past.

The reduction of overall costs of travel and telecommunications⁶ talks for more general contacts, and relatively more contacts with persons in the remote distance, as long distance travel and communications had a steeper drop in their overall costs compared with local travel and telecommunication. The increase in the required total duration of the direct contacts implies a concentration on fewer people than in the past combined with more superficial contacts with a larger number of people overall.

Given the acknowledged trend away from the strongly localized social networks, the two arguments indicate that the activity space of an average person should be larger now than in the past. It is necessary to point out that this activity space consists of two elements the local activity space and the non-local contact space. The characteristics of each can be chosen by individuals depending on their preferences/habits.

The further dynamics of these trends are difficult to forecast. The future ordaining that the full motorization will soon be the rule in Albania. This device shows the dynamics of the citizens of Tirana and vehicles across the country for the years 2001-2010⁷ which is shown in Figure 5. License ownership rates of 75-80% combined with the car access rates of license owners of around 60-70%.

⁴ Commercially distributed gossip about the rich and famous, on the other hand, has increased by orders of magnitude

⁵ The role of the internet as a supplier of personal information and particular of assessment of reputations is still unclear, although the experiences with cumulative ratings of sellers on web-based sites are an interesting indication of future possibilities

⁶ The weighted sums of the relevant monetary costs, the time taken and the comfort of the trip contact. In the case of telecommunication this includes: direct and fixed charges: search time for the other person; quality of connection and its bandwidth

⁷ Source: The archive's central of General Directorate of Road Transport Services www.dpshttr.org.al

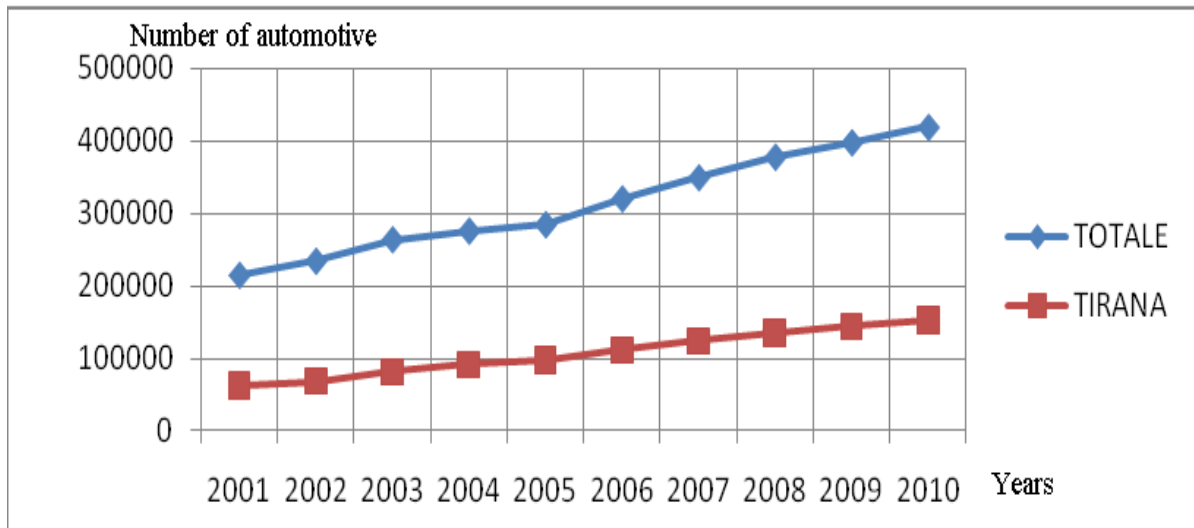


Figure 5: Inventory of vehicles in Albania for the years 2001-2010

The size of the impact will depend on further rate of suburbanization. This will increase car-based travel per hand further, but the relative contribution to social totals will be small, because the impact will depend on the growth of average speeds of travel, which relates to infrastructure. The regional rail systems can have significant impacts, if speeds of movement and travel prices are low for round trip.

There is an increasing amount of literature, which highlights the importance of lifestyle patterns for the structure of a people's travel behavior (e.g. Goetz, Jan und Schultz, 1998). Central to the spatial definition of a lifestyle (**Activity spaces**) is the combination of:

- Work/school location
- Housing location and the style of neighborhood
- Mobility tool ownership

It shows the impact of the last three factors on the size of the activity space. The measure of the activity space is very crude two-dimensional 95% confidence intervals of the geo referenced locations visited during the six-week diary period as in shown figure 6 (Axhausen, K.W & Haupt, T., 2002).

There is currently no data allowing us to trace the development in the sizes of the activity and contact spaces of the public.

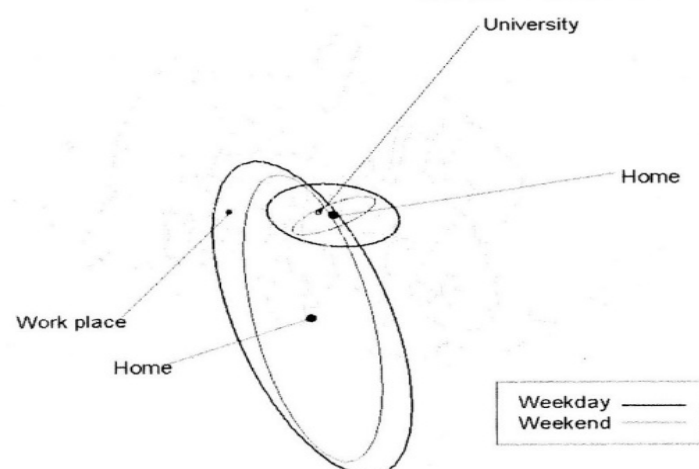


Figure 6: Local activity spaces for two persons by type of working days and holidays

As discussed above, motorization, suburbanization, and the network society should have increased it substantially over the last 20 years, but we have no idea whether it will continue to grow and, if so, how quickly.

Home, work, mobility tool ownership, and social network membership interact and depend on each other. The further trajectory of these interactions will, to a large extent, determine the shape of personal travel in the future. These are expected to be dramatic owing to the expected market penetration of the internet, anticipated further withdrawal from public space, further decreases in the cost of long-distance travel, projected increases in second and third residences, extrapolated increases in residential mobility or, alternatively, long-distance commuting.

Transport planning methodology has, as a rule, ignored the day-to-day dynamics of traveler behavior at the individual level. There were good reasons for an engineering subject, such as transport planning, to limit its field of enquiry to what was perceived to be necessary. However, this does not really excuse the lack of curiosity obvious in the larger-than-required gaps in data availability and theoretical understanding of this issue. It was not only the interest in transport telematics, which has put the questions of day-to-day variability on the table during the last decade, that made it clear that learning and short-term behavioral change are crucial to the assessment of the business and economic case for this bundle of technologies. Transportation planning leads to the conception of a conceptual framework.

2. Conceptual framework

The conceptual framework suggested below can therefore only be a sketch, as substantial issues have not yet been covered by empirical work. They will be flagged below. The building blocks are the following concepts:

- Action stream, activity, and activity calendar to describe the structure of the actions in the short term.
- Activity space and knowledge space to structure the mental mapping of the environment.
- Activity repertoire, needs, projects, commitments and self image to characterize the medium and long-term.

The tool used for this project was the Tirana County Transportation Model, calibrated to the year 2007.

The model was developed to perform comprehensive regional transportation analysis using the ITM/T Model software. The model includes 11 internal Traffic Analysis Zones (TAZs) covering all Tirana city, external zones representing the surrounding areas, intersections (nodes), and road segments (links).

The model is based on the four-step process: trip generation, trip distribution, mode choice, and traffic assignment and forecasts both the AM and PM peak hour periods. A fifth step is land use allocation.

- Trip Generation: estimates the number of person "trip ends" that start and end in each TAZ based on trip rates and land use (housing and employment).
- Trip Distribution: pairs the trip ends from trip generation for each trip type (work trips, home trips, etc.) using a gravity model. The results are zone-to-zone person-trip matrices by trip type.
- Mode Choice: breaks the person trip tables into travel modes (drive, shared ride, bus, walk /bike).
- Assignment: assigns the auto trip table to the roadway network. Two of the important results of this step are travel times and auto volumes.
- Land Use Allocation: allocates a user defined increment of growth (houses, retail employees, non-retail employees) to the internal TAZs.

The result is future year land use (housing and employment) which are used by trip generation in the forecasting process. The land use allocation model uses a typical Lowry/Putnam construct and is sensitive to physical constraints (steep slopes, wetlands), political constraints (zoning), availability of land, and accessibility (travel times take from the four-step model).

The purpose of the land use allocation module is to create future land use scenarios that are realistic, internally consistent, and that can be easily updated. These future transportation/land use scenarios are also realistically influenced by transportation measures including transit improvements and land use policy decisions. Transportation models are deemed ready for forecasting when they are "calibrated" which means they reasonably replicate the base year conditions.

3. Project alternatives

This model was used to analyze different alternatives in the two period peak hours AM and PM. In some alternatives are also made some modifications. Alternatives are described as follows:

Building networks in 2010 received major improvements in the way of the ring identified in the plan. All these improvements in the way are supposed to be part of all other alternatives.

Alternative, the Transportation Demand Management (TDM) / Transportation Systems Management (TSM) is done using the model. Impacts are assumed to occur within a geographic area. Not enough improvements in three main headings listed below.

- Bus service was supposed to ensure the entire geographical area described above. Where bus service was present, the frequency of service is assumed to be twofold.
- The commuter rail service is supposed to be operational (this of course has implications beyond the geographic area described above).
- A 10% increase in participation in programs was supposed for work related travel. This was carried out, reducing home-work trips and work-home by 10% in all the areas of the program.

As a point of reference, the registration data in 2007 to travel the region report a split 10% and 1.5% of public transit. It is noted that while the bus and rail option assess the impact on the use of the model (use of auto vs. transit), the TDM program of travel is taken to result in a 10% reduction in auto travel. So, rather than to develop a detailed strategy, designed for TDM is to reduce journey done, We have received a reduction in trips as a result of stimulation of an aggressive strategy that could include things such as carpooling, vanpooling, and employers approval for off peak shifts.

4. The new urban location and impact on transport

Recent developments in the country's urban areas have already become reality Tirana-Durres metropolitan region-Fushe Kruje, where two poles are distinguished: 1. Pole of Tirana-Durres area, in which are concentrated mainly industrial developments and 2. Pole of Kamza, where thousands are sheltering income. Tirana's population grew by 78% from 1989 to 1999, while from 1999 to 2006 grew by 38%. Growth is slow but is always fast (figure7). From 2007-2017, Tirana has the biggest increase with 57%.

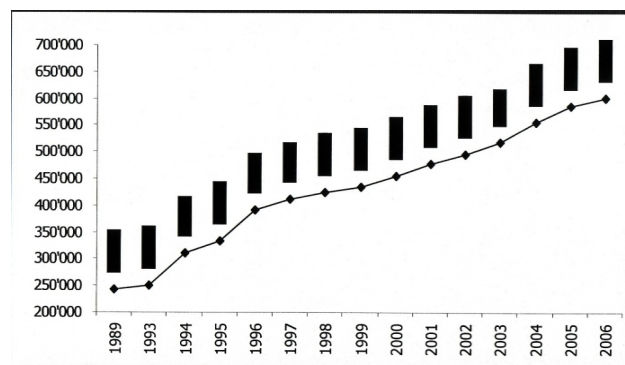


Figure 7: Dynamics of population growth in the city of Tirana during the years 1990-2006

Informal areas constitute 70% of the area of the residence in Tirana to 43% of the population lives. Experience to date with global experience in battle and makes us think that a possible development scenario in the distant future will be more or less like this:

1. **Urbanization**- Tirana will centralize every day and more, thanks to the low conversion of houses to multistory buildings. It also encouraged because the city is the center infrastructure, while still no such alternative development zones. Concentric growth creates a high demand for mobility. The lack of a clear hierarchy of traffic leads to an ineffective use of some parts of the road network.
2. **Sub-Urbanization**-if the authorities will not intervene in time, problems such as parking, great traffic, air pollution, lack of public spaces and on all housing degradation, due to lack of maintenance cultures and laws that property. Families with higher incomes will move on the outskirts of green being accommodated in residential areas, suburban villas, and by improved infrastructure in the suburbs.
3. **Re-Urbanization**-one of the consequences of sub-urbanization will increase the distance to be home-work and therefore traffic. This situation will become worse, as economic growth is the biggest number of car-about 9 times until 2021. Movement at least two times a day, traffic in rush hours and loss of time will lead to the phenomenon of "Gentrification", which means a total overhaul of improvement center, including the change in social structure.

Forecast of polycentric development of the city of Tirana wants to plan the infrastructure development of combined transport systems. Based on the addition of vehicles until 2021, to reduce the heavy traffic that expected to increase should be made changes in transportation and infrastructure project combining private transportation with personal vehicles, with transport by bus and train. This will ease traffic and reduce the degree of air pollution in urban areas.

Conclusions

- You must protect and strengthen the role of Tirana as political and cultural center of Albania made a polycentric development, in order to coordinate and structure of current development trends.
- It should be structure Tirana-Durres metropolitan area, with common objectives and coordinated mobilization of resources by the Central Government, to establish mechanisms of cooperation in the metropolitan scale (with neighboring municipalities)
- New attractions should be built on urban development by promoting secondary centers hierarchical planning through based community.
- Have the best knowledge of the requirements for transport and monitoring in the mobility space and time, which requires the support of relevant institutions and different organisms.
- Integration of other information sources that serve to direct or indirect assessments, are an important element that should be kept in consideration for the establishment of an integrated hierarchy of roads and means of transport.
- Increased cooperation and information exchanges with counterpart institutions and regional centers of Europe would be quite success and a contribution to improve integrated transport and environmentally friendly.

References

- ARE & BFS (2001). *Mobilität in der Schweiz: Ergebnisse des Mikrozensus 2000 zum Verkehrsverhalten*, Bundesamt für Raumentwicklung (ARE) & Bundesamt für Statistik (BFS), Bern.
- Axhausen, K.W., Haupt, T., Rindsfuser, G., Schonfelder, S. & Zimmermann, A. (2002). Observing the rhythms of daily life: A six-week travel diary. *Transportation*, 29 (2) (10), 95-124.
- Beckman R. (1996). *Creating synthetic baseline populations*. *Transportation Research*.
- Ben-Akiva, M.E., Bowman J.L., & Gopinath (1996). Travel demand model system for the information era. *Transportation*, 23 (3), 241-266.
- Hunt, J.D. & Abraham, J.E. Design and implementation of PECAS: A generalized system for the allocation of economic production, exchange and consumption quantities. *Foundations of Integrated Land-Use and Transportation Models: Assumptions and New Conceptual Frameworks*. Elsevier, Oxford UK, 2005.
- Hunt, J.D., Kriger, D.S., Miller, & E.J. *Current operation urban land-use –transport modeling framework: A review*. *Transport Review*, 2005, Vol 25, NO 3, pp 329-376.
- Götz, K., T. Jahn and I. Schultz, (1998) *Mobilitätsstile: Ein sozial-ökologischer Untersuchungsansatz, Forschungsbericht Stadtverträgliche Mobilität, 7*, Forschungsverbund City:mobil, Frankfurt am Main.
- United Kingdom Department for Transport. *Transport Analysis Guidance. Land-Use/transport interaction models*. 2003. www.webtag.org.uk. University Press.
- Waddell, P., et al. 2000. *Longitudinal calibration of UrbanSim for Eugene-Springfield*. Oregon Department of Transportation technical report. Vol 68, No. 3, pp 297-314.
- Wegener, M. Operational urban models. State of the Art. *Journal of the American Planning Association*, Vol 60, no. 1, 1984, pp 17-30.
- Wellmann website: www.chass.utoronto.ca/~wellman 1996.