

Study for sustainable traffic strategy in local government perspective: a contribution towards a strategy for mobility

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Abstract

The sustainable development of cities is one of the main concerns in territorial planning and management. Mobility and accessibility are two essential areas for balanced development in urban areas. This paper aims to bring an awareness of mobility and accessibility to the transport problems in the *Cascais* area where the movements of the population cause traffic problems. This project offers alternatives solutions to public collective transport using innovative solutions supported with the use of new technology. Mobility in the urban areas is a key factor in sustainable development and obtaining feasible economic and social cohesion.

Keywords: mobility, sustainable development, strategy, urban planning.

1 Introduction

The Study of Traffic from the Perspective of Local Government (STPLG) will allow the Municipal Council of *Cascais* to recognize all aspects associated with the problem of transport and of people and goods within the geographic limits of the municipality, and adopt new future strategies in the area of planning, management territorial and urbanism. This will enable the municipality to take action in the transport system, thus enhancing both mobility and accessibility for its constituents [1].

The distribution and emergence of new centers of attraction giving rise to journeys (e.g. the zone of *Cascais* shopping in *Alcabideche*) and the irrefutable



growing need for mobility in the *Cascais* district, (for both residents and visitors) partly due to improvements in accessibility, has not always been accompanied by the development of an efficient public transport network. All these factors justify the general use of individual transport and consequently, the worsening congestion on the road network, parking problems in the main urban centers, deterioration in the quality of the environment and costs associated with the transport systems [2].

It is crucial to invert this situation, by giving public transport more financial aid, visibility and efficiency and also by encouraging journeys using gentler resources (on foot, two wheels, vehicles run on less polluting energy sources). The inversion of this trend must be accomplished not only by a reduction in waste of time, space and energy, but also through new town planning which will reduce these problems by favoring the use of alternative means of transport (public transport, on foot and on two wheels). These changes will provide a model for sustainable development, but also increase the efficiency of family and local government budgets [16, 17].

The STPLG is a fundamental strategic and operational tool for reviewing concepts of territorial management, town planning, mobility and transport which will allow us to establish principles and objectives that will predominate in the future municipal plans for territorial management.

To quote the approach of Jo Milling, 2000, contribute to move forward sustainability and the transport energy efficiency is one of the most important modes [8].

To establish the bases of a new process of decision making we linked environmental, social and economic factors with a group of selected indicators to see result in benefits.

The necessary relationship between the different objectives of sustainable development requires an operative process to the sustainable planning in a way that corresponds to the decisive factor for the success of the local development were the transport issue is one of the main factors [3].

2 Characterization

In attempting to present a synthesis of the mobility problem in the Cascais Municipal District we need to look at its demographic dynamics.

In the course of the last three decades (the most significant for this analysis), the Cascais Municipal District has seen a significant increase in population – from 92,294 in 1970, increasing to 141,498, in 1981 and 153,294, in 1991, increasing to 170,683 listed in the 2001 census. However, we can see that for the decade from 1991–2001, in comparison to the two previous decades, a reduction in order of 11.3%. But in relation to the Lisbon Metropolitan Area we continue to see a greater increase (of 5.6%), the same as occurs in relation to the national panorama (5.3%).

Another important aspect, in understanding the trends associated with mobility, is to observe the age and gender stratification in the resident population

which shows a significant growth of the group to 50–54 and 55–59 years particularly in the female gender.

Another aspect, which is just as important, is to understand how the occupancy of the territory has evolved. In brief, we could divide the evolution in two major time periods intervals: the first up to the 1960s and the second, to the present day.

If the first phase is characterized by a fundamentally polynucleate development (housing and leisure), along the coastline and a 500m wide strip around stations – where the journeys, in terms of time, do not take more than 10 min. on foot then the second phase, which has had great significance in the areas further inland in the municipality where, especially in the seventies, illegal construction occurred with serious infra-structural and urban design problems.

An important event in the territorial evolution of the Cascais Municipality was the implementation of the Municipal Director Plan (1997), at which time diffuse occupancy of the “peripheral territories” was encouraged without safeguarding the indispensable accompaniment at the level of planning and investment in the infra-structures. If the greater density of the population is near the coast, then north of the highway A5, it is the single-family house that predominates in a peri-urban landscape with a strong rural mark. This fact is much more important when we observe that, if close to the railway, mobility is possible on foot, in the more inland areas – where the houses are far from collective transport and the areas of work, services, facilities and leisure – the mobility is based primarily on individual private transport with all the social/urban/environmental inconvenience this entails

To give a picture of the mobility in the municipality, we can say that – according the last census – the Municipality of Cascais registered daily entry of 21,778 individuals, 18,569 (85%) for reasons of work and 3,209 (15%), to study. Of these entries 87% of individuals reside in Greater Lisbon, the larger representation being from the municipalities of Sintra (39%), Oeiras (25%), and Lisbon (11%), and the other 13% from municipalities outside Greater Lisbon. Furthermore we must emphasize the importance of the entries for study of the bordering municipalities, with a weight of 77.8% in total – Oeiras with 41.7% and Sintra with 36.1%.

Freguesias	Restantes Concelhos do País (excepto Cascais)	Dentro do Concelho	Total
Alcabideche	4896	15995	20891
Carcavelos	7932	5370	13302
Cascais	7711	13485	21196
Estoril	6691	8404	15095
Parede	5373	5452	10825
São Domingos de Rana	11634	18194	29828
Total	44237	66900	111137

Figure 1: Resident population that travels daily for work or study (source: CMC/GEST).

Regarding the number of daily exits from the municipality, 44,237 individuals registered, 36,926 (83.5%) to work and 7,311 (16.5%) to study. As for the (principal) destinations, these are the municipalities of Greater Lisbon with a total of 89.7% (mainly Lisbon – 57.9%, Oeiras – 18.6% and Sintra – 8.5%).

As for the internal movement in the Cascais Municipality, this is triple of what was registered in the other municipalities in Lisbon region.

It is important to notice that in the 90s the number of vehicles in Cascais grew by to 125% (approx.). From 55,997 vehicles in 1990, it increased to 125,808 in 2000 – units of light passenger and commercial vehicles.

To illustrate what we have just mentioned in the last paragraph, we present more data relevant to understanding the trend in automobile traffic in Figure 3.

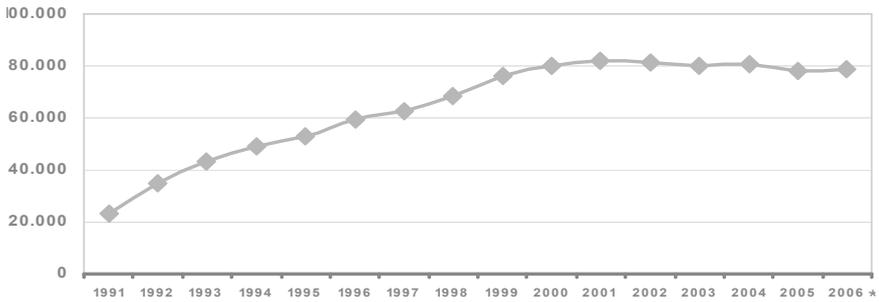


Figure 2: Growth of average daily traffic on the A5 e between Cascais – Estádio Nacional (source: CMC/GEST).

However, it is important to observe the growth use of collective public transport. The use of the railway, in the 1990s is taken for about 70,000 passengers/day [entries and exits] (approx.).

Estação	Entradas + Saídas
Cascais	18 500
Monte Estoril	1 700
Estoril	8 300
São João do Estoril	11 400
São Pedro do Estoril	4 000
Parede	13 500
Carcavelos	12 500

Figure 3: Average daily number of passengers, entries – exits, per station (source: CP/CMC/GEST).

3 Scope of the study

To respond to the problems of urban growth it is important to answer the following questions:

- a) What are the costs of the present forms of mobility and how can alternative forms of mobility and accessibility be developed?
- b) How can the urban space be planned and managed to improve mobility and the efficiency of the infrastructures?
- c) How can greater efficiency of public transport be achieved in response to the different mobility needs?
- d) How can the evolution of the needs of the population be recognized and global consciousness increased as to the costs and external factors of mobility?

Thus, it is beyond question that the STPLG be an informed and iterative process which should include (in its construction) some kind of involvement by the various intervening agents in this process, both at the level of consultation and public discussion (associations of residents, businessmen, hoteliers, employees in the community and private sectors, social work agencies and NGO's) and at the level of discussion and decision making (elected). In this sense, for the implementation of the STPLG to be properly integrated in the local authorities future policies and projects of mobility and transport, there need to be three fundamental structures: the first the power to make decisions (executive and municipal assembly), the second the coordination (mayor's office and heads of departments) and the three to accompanying technical support (departments and technical team).

3.1 The STPLG as a tool

To gain a clear understanding, the study is importantly summarized and the content of the recent international public request for tenders (in the phase of being formally announced) will serve as a guide in the paper.

According to the Bidding Specifications, the subsequent was what was presented to the applicants [1]:

General clauses: “[...] Art. 1 – Objective – The object of the contract consists, in accordance with Special Clauses of this Bidding Specification and respective annexes, in the acquisition of services for the elaboration of the “Study of Traffic from the Perspective of Local Government – SPTLG”

- a) Acquisition of services for the elaboration of the “Study of Traffic from the Perspective of Local Government - SPTLG”
- b) Supply of the tools for planning (software and hardware) of the model of transport of the study to be operated in the future for the technical services of the CMC, its installation and calibration;
- c) Adequate technical training for 2 technicians of the CMC, to acquire skills as operators of the system to be installed. [...]”

Special Clauses: The STPLG aims to be, in conceptual terms, something much more complete and comprehensive than the name suggests being



theoretically what is known as the Plan for Urban Travel (or Mobility Plan). This plan, which the *Cascais* Council aims to carry out, will be a strategic and operational tool which will support the understanding and review of the abovementioned ideas. The STPLG thus aims to respond to the recommendations of the Regional Plan for Territory Management of the Metropolitan Area of Lisbon (PROTAML).

Discussion about the development of mobility patterns motivated by the urban structure and form which developed in the Metropolitan Area of Lisbon (AML) has been incorporated into the PROTAML. The example of “urban sprawl” verified in the AML has also been noted in the *Cascais* municipal area, especially in the districts of *São Domingos de Rana* and *Alcabideche*. This type of growth is responsible for an increasingly unsustainable kind of mobility – greater dependence on time and energy with consequent rises in costs of travel and to the environment.

The urbanization process which has taken place has led to an increase in the distances travelled and journey time, whether unavoidable or for other reasons, such as lack of coordination of the collective public transport networks, to more transfers, traffic jams due to the increased volume of cars on the road and a transport network which has become highly complex and with high operation costs [11].

Some studies related with public transit strategies and solutions, indicated that public transport was viewed as a strong public good, and a viewed as an essential public service fundamental to public welfare and the environmental solutions where great coordination between investment and planning guaranteed that the different modes transit complement one another. In some European cities (such as Freiburg in Germany and Zurich in Switzerland) we can find impressive solutions with real coordination of investments and routes in the way to guarantee that the transit modes complement one another [4].

Thus it is necessary and urgent to reverse this trend, take action to combat the waste of space, time and energy, redirect the policies of new urban development and urban renewal to more controlled forms of development, creating urban areas where a mixture of occupations will allow this dependency on time and individual transport to be reduced; increasing the efficiency of alternative means (travel by public transport, on foot and cycling).

In order to reach these objectives it is necessary to have an analysis done and apply it on resource money for sustainable development This goal is very difficult to reach because of the difficulty analyzing the great number of relations between the object of study and its context. So to go forward to sustainable development he have to promoted a “horizontal” perspective adapted to the real necessities of the people and the local authorities [15].

In this way guided by the objectives and the working method in the scientific area of mobility we aim to more the best choices for the population of *Cascais* which will reinforce the protection of the urban environmental, giving continuity to the recommendations of PROTAML and the good practice of the European Community – COM (2004)60 of 11/02/2004 and also of the UITP (International Association of Public Transport) [6].



4 Construction methodology and contents of the STPLG

To build a new design process we need a methodology which can support our management of the problem. But before defining a methodology we need to acquire a vision to increase a sustainable mobility.

In Resilient Cities, Peter Newman and others refer to seven elements to help to rich this goal:

1. A Transit System that is faster than traffic in all major corridors;
2. Viable centers along the corridors that are dense enough to service a good transit system;
3. Walkable areas and cycling facilities that can mean easy access by non motorized means, especially in these centers;
4. Services and connectivity that can guarantee access at most times of the day or night without time wasted;
5. Phasing out freeways and phasing in congestion taxes that are directed back into the funding of transit and walk/cycle facilities as well as traffic-calming measures;
6. Continual improvement of vehicle engines to ensure emissions, noise, and fuel consumption are reduced, especially a move to electric vehicles;
7. Regional and local governance that can enable visionary green transport plans and funding schemes to be introduced [5].

In this time and context the local government has the benefit of a pre-analysis (stage 0) which enables it to gather information dispersed information, as well as supplying a primary working base for carrying out the STPLG.

However, methodologically, we can say that the STPLG has four stages: the Pre-analysis stage (Stage 0 – already carried out) and the stages already opened to public tender, Analysis (Stage 1), Research into Technical Solutions and Formulation of Scenarios (Stage 2) and the Implementation of the STPLG project (Stage 3)

4.1 Stage 1 – analysis

This stage will enable us to understand the existing dysfunctions. The STPLG should thus identify the discrepancies between the system of travel and urban development, describe mobility and its development, the problems of accessibility, according to social and spatial structures and their form, compare the principal disparities of the different means, the insufficiency of the networks – pedestrian, cycleway, public transport, individual or goods vehicles – evaluate the criticality of damage to the urban environment as regards to safety, noise, pollution and urban landscape, and finally, itemize the inconsistencies of the system of travel.

The diagnosis must have clear the compatibility of different means of transport with the other uses of the road space in the urban environment. It will particularize with what standard of service and what impact on the urban environment the system of travel guarantees mobility. It must highlight the



possibilities of the efficiency of each means from a socio-economic point of view.

4.2 Gathering of data

The analysis will be based on the gathering of existing data (previous studies of the territory and transport, traffic counts, surveys ...) and in gathering complementary data of domestic surveys (origin/destination (O/D) – motives and means, parking, alternative means, reduced mobility), interviews, etc.

The gathering of data will be done through the respective dossiers (geography and demography of the territory, mobility, accessibility, environment and energy), taking into consideration the following:

Territory – minimum functional breakdown – number of homes and/or establishments, areas and density of residences, private businesses (commerce, industry, services, restaurants, hotels, education), and public employees (services, health, education) resident population, students, resident and employed inside and outside the district and non-resident and employed within the district, age group, level of education, income level.

Mobility – minimum breakdown of general indicators in the district and parishes – global average number of journeys/year/inhabitant by age group, by means and weight of the mobile population and of the motorised population, distance travelled by means and purpose, average travel times by means and purpose, by the resident population, students, employed and unemployed. The minimal functional breakdown of the purpose of a journey will be travel to workplace and home, school, shopping, work, health, leisure. As for the means of transport, they will be individual transport on foot, two wheels and by road, collective transport by bus and rail. The minimum functional breakdown could also be analysed by moments of the day, in respect to the peak periods in the morning (07:00h–10:00h) and in the evening (17:00h–20:00h) and others (e.g. lunchtime). Movements O/D (intra- and inter- district) by means, purpose and time period. Other results pertinent to interpreting behaviour patterns of mobility of the population of the district could also be introduced.

Accessibility – An appraisal will be made of the hierarchy and structure (the physical, geometric and traffic conditions) that influence the functioning of the transport network (road and rail) and its organisation by road and rail dossiers. Pertinent to the traffic conditions are the factors which are evidence of overload, in particular, in internal and internal/external journeys (transference).

Equally, data will be gathered in terms of supply and demand, of the traffic systems and parking in relation to individual transport and in relation to collective transport and the remaining alternative means (two wheels and pedestrian).

In relation to traffic counts, as well as gathering figures at the rush hour and other times of the day, they will be gathered at times which do not coincide with holiday periods. A minimum of forty traffic count posts and nine O/D survey posts are being considered.

This dossier will concentrate on two themes: Public Transport with an analysis of the results of traffic counts and surveys, so that we can take bearings

on supply and demand, relative to modal changes, the tariff system and other factors in the analysis that explain its use, and Parking so that we can show clearly the proposals for planning and the respective regulation, bearing in mind the implementation of PMOTs

Environment and Energy – this item will make, at the very least, a report on the quality of the areas that are subjected to heavy traffic and which, at different times of day, register noise levels that are higher than the permitted maximum. These areas should be on the municipal noise registers, so that they can be equated to the problems at the level of the objectives that they hope to achieve. This register should identify the precise zones to which urgent measures should be applied, like for example, classify them as zone 30 or alter the traffic circulation plan. It is to be remembered that the recommendations for urban design of the road networks must take into consideration the data in the noise registers. Graphic representation of the black spots (buildings exposed to daytime noise levels higher than 70 dB is essential. The percentage of the population exposed to these levels can be compared in different situations and can be used to calculate indicators to aid in decision making. On the other hand the municipality is concerned with identifying the volume of pollution, using collectors which should be placed near the road networks where the traffic is heaviest and in zones where the population is most exposed. In this context, considering the incidence each of these has on the urban environment (public spaces), atmospheric pollution cannot be excluded.

Costs of the travel system – as it is necessary for the municipality to draw up an assessment of the journeys made, we must consider it, a priori, necessary to make a primary financial calculation to give references beyond the formulation of scenarios and even the selected project. The most common first approach is to disclose the financial contributions of the different intermediaries and a balance sheet relative to the public transport networks and parking. We must avoid double sums that could result from attributed subsidies, but the global municipal budget for transport must include the revenue, running expenses and investment originating from the local government itself and what comes from central administration. In relation to the travel budget, the total of revenue and running expenses and the amount of investment must be distributed among parking and road circulation operations and that of collective transport (bus stops, stations).

4.3 Thematic analysis

Subsequent to the gathering of data, issues will be made clear and the way to approach analysis of dysfunction and other problems found; the consequences for urban operation, the developments in progress and the expectations of the residents. Among the themes that we know cause problems, the following are the most obvious: urban development, organisation and management of the transport system, the use of space (ground use), collective transport, parking, motorized circulation, alternative means, reduced mobility, interconnection of the various means, environment (quality of the urban area), noise, energy and quality of life [13, 14].



4.4 Validation of the analysis and definition of STPLG's objectives

Validated the diagnostic (former: meetings with the commission technique and the commission of coordination, agreement with the population...), one will structure the priorities of intervention having considered itself, in according with the objectives of the ETAC.

4.5 Stage 2 – research into technical solutions and formulation of scenarios

Within the scope of the Regional Plan for Territory Management of the Metropolitan Area of Lisbon (PROTAML), the Metropolitan Area of Lisbon (AML) the further revision of the Cascais Municipal Plan and its neighboring district of Oeiras, as well as the neighborhood district of Sintra, the above stage should identify the most favorable sequence for a common solution regarding mobility. This issue should furthermore be linked to the question of financing projects/solutions aimed at altering the present scenario of preferred mode.

Thus we hope to arrive at best a strategy for mobility that aims to satisfy the population and the best solution for urban mobility, especially resulting from the project of public space and ground use.

“Bearing these options in mind, featuring the system of management and the provisional data of the population and of employment, in accordance with the expected growth of the residential areas, the STPLG will help us to understand the facts and serve as a basis for defining a strategy for travel. It is also important to remember that scenarios have to be drawn up after this analysis, as it is a prospective instrument to encourage collaboration between the various players and support the debate” in CMC [2].

At this stage the following must be taken into consideration:

1. Technical solutions and comparisons

For each issue (dossiers) various hypotheses should be proposed for solutions or a combination of these, such as the methodology of evaluation (multi-criteria analysis or comparative benefits, investment costs, assessment of energy and environment...), which allows us to compare the procedures/measures for each scenario in the new travel system. Simulation techniques should be applied for subsequent use by the local authority.

2. Choice of scenario or the chosen solutions/projects

As was necessary in the previous stage, the form in which the decision maker, starting with the principles of comparison and according to the fixed objectives, will be able to choose the technical solution or the most appropriate scenario, will be by debate at this point in the study.

4.6 Stage 3 – formulation of the STPLG project

“The depth of the study must be compatible with the necessity of, having chosen the scenario of the preferred mode that we hope to achieve, knowing how to manage the complexity of a travel and transport system, linking it from the street/neighborhood level to the network/council level.

Knowing how to apprehend all the means of travel and knowing how to link the different scales (global and local), acting on each means according to



priorities, knowing how to keep in mind the impact of each measure on the whole set of means and reconcile the multiplicity of functions of the road network (with its multiple hierarchies), as for example, the different purposes of travel (and use of the road network) and the urban quality, all this must serve to ascertain the level and depth of the STPLG study” in CMC [2].

The formulation of the project must take the following into consideration:

1. Detailed study of the solutions or the scenario chosen

The chosen scenario will be detailed so as to allow it to be carried out; being especially explicit in its planning, over the next 10 years: modalities, techniques, place within the institutional framework, financial framework.

2. Formalization of the STPLG project

The final document will clearly show the content of the actions to be taken, its viability (technical, administrative, financial ...) the plan of action, its coherence meeting the criteria for the formulation of the policy of mobility entered upon.

3. Accompaniment and evaluation –monitorization

This will consist of a methodology and the respective tools necessary to accompany and evaluate the process as it goes along (table of indicators and/or other method deemed appropriate).

This table of indicators – monitorization – should be accompanied by an organized plan by the entity which is going to accompany the implementation of the STPLG.

4.7 Determinant factors of process

The objective of the developed process is the creation of an operative instrument to support the promotion of sustainable development, through urban planning.

The elaboration of the proposed process tends to give execution to the objectives and sustainability strategies that are materialized through the urban planning.

In a second point, the process still intends to facilitate an effective marking of the works and a coordination of the teams of the project in its several tasks and specific studies tends in view the obtaining of efficiency gains and to minimize losses.

The inclusion of all three components of sustainability in equal weight in the process, in order to facilitate the satisfaction of conditions regarding the implementation of the human activities, is the other of the aspects of a viability of the process.

The possibility of an effective participation and accompaniment of the developing works by the population, more knowledge, preventing the occurrence of possible problems and conflicts of interest, guaranteeing simultaneously a faster acceptance of the new spaces in the urban city. These results are a decisive factor of the new process. Another decisive factor of the process is the implementation stage and its efficiency warranty. The phase of implementation of the plan, foreseen to develop in an alone action it is controlled through records that have the objective of providing gain of efficiency in the three components.



The possible separation by functional areas of the actions to implement with the plan would facilitate that for each one of the sustainability components, specific steps are given in the correct way of new sustainability practices with rigidity and warranty of results.

Those results could be comparable to the sustainability indicators used during the development of the elaboration of the plan.

The result of the application of this process of sustainable urban planning would constitute a reference for future expansion and urban renewal actions supported in a base of data of the relationships: action ↔ relationship in an action relation database.

That database made, made available to public entities and urban planners allow the occurrence of less efficient actions with negative effects [3].

5 Conclusions

Looking at the recent history of urban development in the Cascais Municipal district, especially in the last two decades, the transport systems and their respective networks have reached max. capacity, already showing some breaking points due to the pressure that they are under (especially the road network, because of the widespread use of the private car). This fact has led to a depreciation of the quality, not only of mobility and accessibility, but of urban life symbolized by comfort (in the widest sense) and the landscape.

The other side of the spectrum described above could be attained by policies on ground use and on transport, and in the relocation of home vs. work activities. But the target of mobility will never be achieved if individuals are not encouraged to opt for alternative modes of transport [10]. Whether by promotion of greater use of heavy networks of collective transport (railway), and by improving the service of the road networks (buses) regarding cover of the territory, frequency, reliability and comfort, or whether by the implementation of penalties for using private transport and encouraging movement on foot or by bicycle

The implementation of the STPLG will give the Cascais Town Council a powerful tool when it comes territorial decision making about the territory. Whether it is the granting of private licenses, for carrying out PMOTs by a lower hierarchy that could lead to alterations in the Cascais Municipal Plan. By the dynamic brought about by the monitorization of the Municipal Plan, or even by local and/or global socio-economic changes, the fact is, that the local authority experts and respective political decision makers possess an instrument of evaluation by foresight of the onus of any project or plan with a resultant alternative model of the existing and planned network, subject to alterations in the load (in number or type) that could come about because of this intervention.

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