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The Project Planning of Urban Decongestion

A contingent valuation methodology of making scenarios

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Keywords: Contingent Valuation, Transportation Planning, Urban Decongestion

Abstract: This study introduces a methodology for the evaluation, among a set of possible plans and/or policies, of a transport system which could reduce the effects of the network congestion on an urban area. Hence it is proposed a procedure which contains a new element compared with the current methodologies that is the final user's evaluation of the examined system by turning to the application of the *contingent valuation method*, a technique like *stated preferences*. The approach we propose is based on the necessity for a determination of an optimal solution to the urban congestion to be established on the politic acceptability by the final user. Solutions which result virtually feasible for a public administration both on a technique and economic point of view often meet hostility by individuals. Consequently, it would be interesting for policy makers to adopt a process of valuation which could let to understand the user's sensitivity and hostility towards specific configurations of the system, chosen as solution to decongestion (*traffic calming, road-pricing, auto-free zones*) and consequently to make less unpleasant the strategy to be carried out to control congestion (Harrington et al., 2001). In this way, a user does not judge the implementation of a set of projects made by a decision-maker as imposition and he is willing to pay in order to fulfil the chosen scenario. Finally we describe an application of the proposed methodology relating the definition of the integrated transport system in the metropolitan area of Bari, chief town of Apulia.

1. INTRODUCTION

In several metropolitan areas, the increase of the private mobility has caused serious problems of congestion, compromising thus economy, the qualities both of the urban environment and of life.

The last thirty years of Italy as well as of other industrialized and developing Countries have been characterized, on the one hand, by a strong increase of the road network (urban and suburban streets; motorways), on the other by a remarkable increase in the use of private means of transport too. The transport demand goes on increasing with a higher growth rate than that of new roads construction and/or that of the existing network facilities.

Consequently, the urban planning should be organized through a specific system of plan and control of mobility in order to limit congestion. The strength and the kind of congestion, and the effectiveness of the solutions to be adopted, may considerably change according to the dimension and the scheme of the examined urban area, as well as to the available options of transport and to the factors which arouse the same congestion.

2. INTERVENTIONS PLANNING

The emphasized problems give prominence to a rational retraining of urban area , that is possible through a correct analysis of the accessibility needs closely correlated with the territory use.

It is necessary to better the territorial planning and to plan interventions of control in order to obtain the necessity of mobility and favour the compatible and balanced development between demand and supply.

In other words it is necessary to plan alternative projects able to calculate again the allocation of demand between private and collective transports bettering thus the accessibility of system. There are two alternative typologies of urban accessibility:

a) urban highways for the private transport system;
b) heavy roadways for collective transport system.

In the first case we prefer the private transport and suitable parking policies are to be adopted in order to satisfy that areas having a strong demand of mobility; in the other case we encourage the collective transport, by realizing, for instance, light railways. If on the one hand, the idea of transportation system for giving the city more accessibility may be compatible with economic and social aims, on the other it may be clash with environmental development aims.

Between these two typologies, we can value either tactical or operative policies of intervention able to foresee both parking and collective transport projects and influence the structure of the mobility demand (*Traffic Demand Management)* by rationally drawing the system of supply.

2.1 Urban highways and parking policies

By foreseeing insight routes towards urban core, interventions cannot leave apart the realization of parking facilities in the areas characterized by heavy parking demand. This type of intervention seems to be inconsistent with the aim of reducing network flow intensity when it is not not supported by suitable management supply given by:

- typology;
- number;
- localization;
- capacity;
- price system;
- tax and credit control.

Actually, in great urban area the hard traffic is due both to insufficiency of parking supply for residents, by means of on-street parking, and to a strong long lasting demand of parking not properly attracted by the collective transport system. In fact, the typical parking demand in the urban areas causes an increase of the time permanence on network (time of research on a free parkink lot) producing traffic congestion.

With this perspective, the urban parking policies (*road pricing, modal interchange structures, new parking facilities*, etc) are not to be regarded as a mere physical interventions on territory but, if properly fit in a policy of redefinition, as an intervention which may result as a relaunching for the urban centre which is supported mainly by short-medium parking demand.

The importance and the efficacy of urban parking planning is pointed out by the remarkable interest in the definition of analytical instruments to valuing the effects of these policies on the transport system.

For this aim transport research has proposed different system of mathematical models, also with multi-user approach, to simulate parking user choice on the basis of prefixed scenario of park supply and transport system, by taking into account characteristic policy parameters. The simulation result supplies the number of vehicles presented in the available parking systems and in determined time bands.

2.2 Heavy roadways and the collective transport system

The availability of an efficient and comfortable urban collective transport represents a fundamental element for the modal distribution of the balanced transport demand between the collective and the private ways.

The improvement of the collective transport system may be obtained in different ways depending on the planning level we are going to adopt. Strategic interventions, such as the railway line projects, require remarkable

resources and may cause unexpected effects both on the transport system and on the territory. In fact, their infrastructural component may deeply influence the vocations of the interested areas. Consequently, these projects should form part of a wider matter of urban functional planning, as to urban and territorial activities localization policies.

The realization of railway lines, even though characterized by high costs and long times of construction, gives remarkable benefits for the community allowing the "rapid movement" of numerous users compatibly with aims of the polluting emissions reduction.

Particular interest should be addressed to the possibility of adopting light rails which could be easily included in the urban context just because they need a lower physical size. The realization of collective transport systems by fast tram-cars which, unlike the underground, may better suit to a reticular structure such as the urban one, are hoped too.

The rational concept of a collective transport system, together with supported interventions to the private transport users may also aim to the core areas conversion into pedestrian precincts (*auto-free zones*), provided it is assured by a high level of accessibility in order that those services and resources supplied by those areas are more easily accessible.

3. AIM OF THE STUDY

The aim of this study is to introduce a methodology for the evaluation, among a set of possible plans and/or policies, of a transport system which could reduce the effects of the network congestion on an urban area.

Hence it is proposed a procedure which contains a new element compared with the current methodologies that is the final user's evaluation of the examined system by turning to the application of the *contingent valuation method*, a technique like *stated preferences*.

The approach we propose is based on the necessity for a determination of an optimal solution to the urban congestion to be established on the politic acceptability by the final user. Solutions which result virtually feasible for a public administration both on a technique and economic point of view often meet hostility by individuals. Consequently, it would be interesting for policy makers to adopt a process of valuation which could let to obtain not only a politic but also an economic support for those transport users who are willing to pay in order to fulfil the chosen scenario.

In other words, the use of the *contingent valuation* (CV) would be a useful instrument of decision to all people who are willing to chose which intervention and/or program to implement in order to relieve both the urban and suburban traffic network in European and Italian cities. This could be

allow to understand the user's sensitivity and hostility towards specific configurations of the system, chosen as solution to decongestion (*traffic calming, road-pricing, auto-free zones*) and consequently to make less unpleasant the strategy to be carried out to control congestion (Harrington et al., 2001). In this way, a user does not judge the implementation of a set of projects made by a decision-maker as imposition.

Subsequently we describe one possible application of the proposed methodology relating the definition of the integrated transport system in the metropolitan area of Bari, chief town of Apulia, Italy.

4. METHODOLOGY OF ANALISIS

4.1 Definition of the project scenarios

The methodology proposed on a first phase which starts from the study of the physical, social, economic and environmental features of the considered territorial context, points out the possible programs of intervention on the transport system, not only related to the qualitative betterment of the existing infrastructures, but also, if necessary, the realization of transport systems and lines.

The possible system configurations are defined by the characteristic parameters of the before analysed typologies of intervention,that is " urban highways", "parking" and "collective fast transport", see *Table 1*.

Table 1. Characteristic parameters of the typologies of intervention

Urban Highways	Parking	Collective Fast Transport
- definition of the routes	- number parking systems	- number of fast lines
- geometrical road layout	- system location on the territory	- routes
	- capacity systems	- capacity of each line

After having defined the possible alternative programs of intervention on transport system for a determined territorial context, we go on with the valuation of impacts and the comparison among the different proposals. This phase is usually performed through the application of simulation models and methodologies of the simulation stochastic models, able to define the optimal distribution of the transport demand between public and private way. *Figure 1* reports a scheme which shows different phases of a valuation methodology of the scenarios of intervention (Sassanelli, 1996).

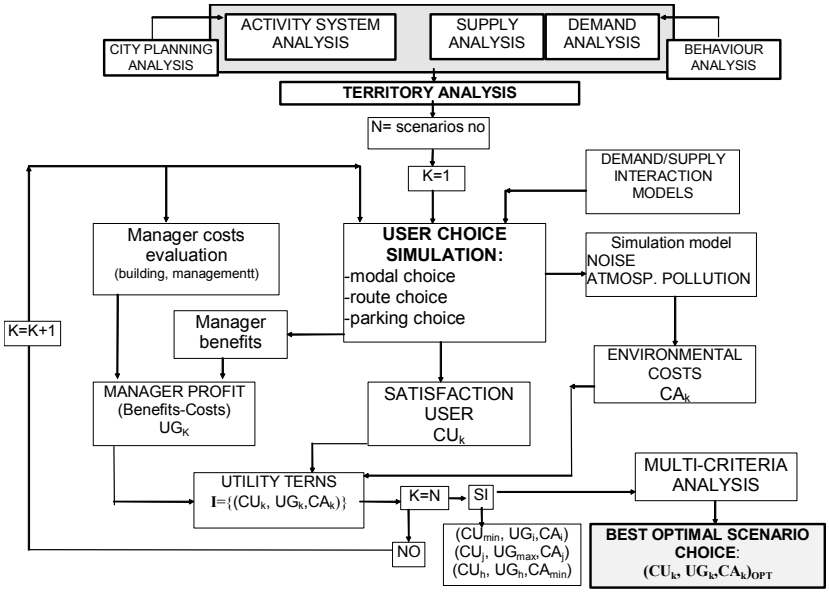

Figure 1. Project scenarios evaluation methodology Flow-Chart

The simulation procedures aim to reduce the urban central areas congestion. Thus, a list of possible future urban scenarios is associated with the probability for the foreseen interventions to ease congestion problems, are taking shape. Hence a list in which the scenario meeting with the interventions having a good chance of giving benefits is first.

To each element of scenario list is associated the related cost which is in its turn sum of the various rates of the project cost.

If we consider that the relief of traffic congestion is the user's and the environment's aim, and that the lowest possible cost is the administrator's aim as well, through the multicriteria analysis we reach a solution of compromise made explicit in a new list of scenarios which moves the limits of the previous list and defines the final one then introduced to the competent institution for the related decision.

4.2 A contribution to decisions: the contingent valuation method

The methodology goes on with the application of a contingent valuation (CV) procedure, a technique *stated preferences* which, basing on sample surveys, uses the interviewed persons' statements to know their preferences directly (Alberini A., Cooper J., 2000).

In our case, the contingent valuation methodology aims to use the information related to the different configurations of the urban mobility system given by the interviewed people in order to estimate a function of utility referred to a specific option. Data so obtained allow us to have directions related to the order of quantities of the different variables to be measured.

The CV method is divided into a series of phases which we report in *Figure 2.* Among the individualized phases it is very important for the questionnaire to be correctly planned in order to obtain reliable final quality information and assessment results (Montini, 2001). Data obtained from the questionnaire are then elaborated through opportune statistic models through which to estimate parameters.

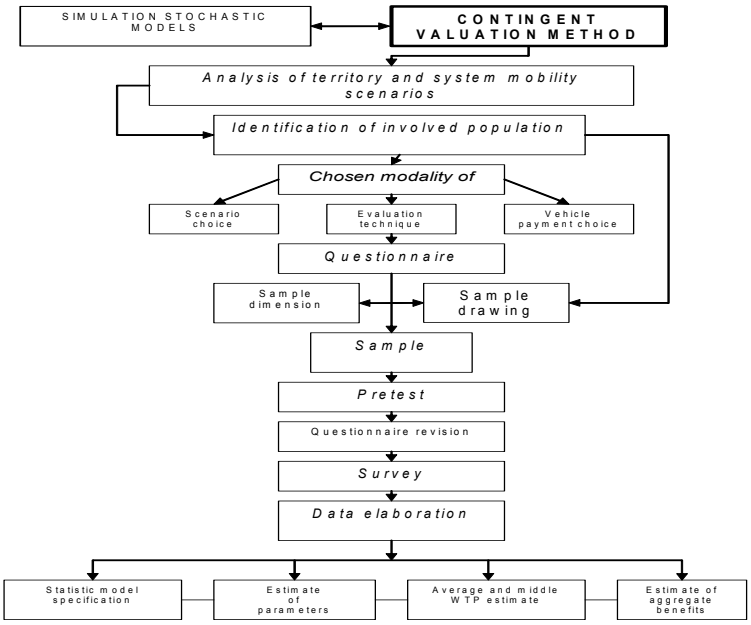

Figure 2. The contingent valuation survey phases

At this point, the policy makers have got all the necessary information to recognize the effects of each configuration realization. On the basis of the results obtained by the combined action of simulation techniques and of the *contingent valuation procedure* the policy makers can successively choose the most suitable scenario of projects for a solution of an urban central area congestion.

5. A CASE OF STUDY

5.1 The metropolitan area of Bari

The application of the proposed methodology concerns the metropolitan area of Bari, chief town of the region Apulia, with the aim of defining a scenario of interventions which could mitigate congestion in the examined area and, at the same time, encourage the urban and suburban transport system well balanced and neat functioning and development.

Current literature advises to assimilate the metropolitan area of Bari with the provincial territory, having a surface equal to about 514.000 hectares having a resident population of about 1.560.000 inhabitants distributed in 48 cities, of which about 316.000 only in the chief town (2001 ISTAT resource).

Actually, if we consider the high values of traffic which characterize the area, the high home density, the intense exchanged socio-economic activities, the area of study cannot be defined into the strict geographic configuration of provincial borders but it can variously be depicted. With reference to home-based work trips, the conurbation of Bari is constituted by the town of Bari and the neighbouring cities of Giovinazzo, Bitonto, Modugno, Bitritto, Adelfia, Valenzano, Capurso, Triggiano, Noicattaro, and the possible expansion of the following cities: Mola, Molfetta, Casamassima, Palo del Colle. If we consider all purpose trips, the already recognized conurbation has to take into account the coastal corridor north of Bari to Barletta, with possible extensions to Monopoli.

In our study we assume that the metropolitan area of Bari is constituted by the city of Bari and by other communes with which it has intense traffic relations of a demographic and economic kind. Moreover, in the corse of time, Bari and the cities of Giovinazzo, Bitonto, Modugno, Bitritto, Adelfia, Valenzano, Capurso, Triggiano, Noicattaro, Mola has been object of a great urbanization that they can be regarded as a unique urbanized area. However, even if this process of aggregation has a strong power of attraction of the centre of Bari, it has not had a suitable development of the public transport system and a consequent increase of congestion in the whole area.

5.2 First phase: the transport system and the project scenarios

On the communal and regional administration's behalf, we have used data and concise results of the different studies on the metropolitan area of Bari prepared by researchers of Transportation Engineering, Polytechnic University of Bari.

The first phase of the methodology organized into the following four "steps" foresees a list of the priority of interventions for the transport system of the metropolitan area of Bari, in which each element is linked to likely costs.

The *FIRST STEP* concerns the definition of transport demand and supply in the area. The traffic data concerning the communal area of Bari, reported at the current situation, in the 6.30-8.30 a.m. charged time band, register a volume of trips (including all kind of transport) of 270.000 units, of which about 60.000 come from the outside the city of Bari using public transport (47.000) and private transport (13.000), and complete their trip inside the urban area by distributing towards the several neighbourhoods of the city. To the 270.000 trips into the city area 11.000 arrivals coming from the exterior to the industrial area by public transport (about 7.000) and by private transport (about 4.000) must be added. Data concerning the transport demand and supply together with the demographic and economic features of the area opportunely subjected to rigorous and deep analyses of scholars has allowed probable programs of intervention able to guarantee both a qualitative betterment of the already existing services through technological innovations and a quantitative one through new and necessary transport infrastructures.

The *SECOND STEP* regards the proposals of intervention concerning the following typologies:

1. *Railway transport*: interventions regard railway lines as axes of penetration of public transport. Programs of control and regulation of circulation, systems of suppression and protection of level crossings as well as the expansion of the central railway station node of Bari are put into work of modernization. The majority of these projects has an expected cost of about € 230 million.
2. *Fast collective transport system*: interventions tend to satisfy the demand of a mass mobility through the realization of five urban car corridor and/or pre-metro[1] lines according to the prevailing directions of the North-South and East-West urban development. Urban car corridor lines are expected to have costs of about € 6 million per kilometre and a complexive cost of about € 400 million, whose value get higher and higher in the case of a rail pre-metro line. Among the proposals which

[1] A) First level fast lines:
   1. S.Spirito – Palese – Fesca – S.Girolamo – Marconi – Libertà(North Zone) – Murat – Madonnella – Japigia - Torre a Mare;
   2. Modugno – S.Paolo – Stanic – Libertà (South Zone) – Murat;
   3. Loseto – Ceglie – Carbonara – Picone – Poggiofranco – Libertà – Murat;
   4. S.Pasquale – Carrassi – Murat – Madonnella.

B) Second level fast lines:
   1. Japigia – S.Pasquale – Carrassi – Picone – Stanic – S.Paolo.

have been recently realized there is the light rail service which links the city of Bari up to S. Spirito, Modugno. and Torre a Mare according to the East-West direction. The fast line linking the airport and S. Paolo neighbourhood up to the central railway station is under construction. Another important element for a good working of the fast collective transport system is constituted by transport nodes or intermodal terminal such as the railway station (expected cost about € 40 million), South S. Pasquale, Palese, Industrial area and Torre a Mare nodes (expected costs of about € 8 million), secondary nodes constituted by the intersection of two transport lines and modest parking areas in order to link the central or outlying areas (four central nodes and ten external ones are expected).

3. *Parking facilities*: central business district (CBD) parking and fringe parking. The first ones are to be near or in the close proximity of the central areas where there is demand accumulation; the latter are to be in the peripheral areas near the urban public transportation. In the metropolitan area of Bari it is necessary to carry out CBD underground parkings in the areas belonging to the municipality having a maximum capacity of about 6.500 car parks (estimated cost about € 100 million), intermediate parking facilities having the functions of CBD and change-of-mode facilities in the outlying areas of Bari with a maximum capacity of about 3,300 car parks (cost of € 2,2 million for surface parking lots; € 48 million if parking structures) and fringe parkings near the radial axes of the road network having a maximum capacity of about 4,000 parking places (variable cost from € 2,5 million to € 60 million). At the present, CBD surface parking have been realized in the neighbouring area of the urban centre. The realization of a CBD underground parking in the area of Cavour Boulevard has got to a start. There have been few change-of-mode parkings. The estimated costs for the construction of parking facilities, according to the kind, vary from a minimum of € 110 million to a maximum of about € 220 million.
4. *Road network*: we can distinguish a first level road network (regional and national) and a second level road network, which has an internal link to the metropolitan area. The estimated costs are about € 600 million. As regards the programs of intervention, the works of modernization of highways 16 North and South and the highway 100 have been finished. The construction of the North-South urban corridor which is going to link Carbonara up to the port is near.
5. *Port*: projects aim to incresce the port system both for the good and passenger ftraffic by integrating the port structures with the rail and road ones at a total cost of about € 300 million. Only the half of projects (floor digging, enlargement of S.Cataldo pier, Pizzoli pier, Foraneo pier and Vecchio pier, modernization of structures) have been fulfilled.

6. *Airport*: projects aim to better the existing infrastructure compared with the exigencies of air traffic (passengers and goods) both on a regional and on a national level. The expected works have a total cost of about € 54 million. Fulfilled interventions concern the expansion of the air reception facility, the road network to favour the access to structure and the extension of the runway.
7. *Intermodal terminal*: this structure allows a wider use of intermodality in the good transport. The projects concerning this question aim to realize this kind of work and to locate it in the outlying areas of Bari, having a total cost of about € 42 million.

The *THIRD STEP* consists in evaluating the impacts which each project causes on the mobility system and on the involved actors. This phase is usually fulfilled through the application of methodologies and simulation mathematical models able to define the optimal distribution of demand between public and private way. The available instruments, in fact, are able to simulate the different dimensions to be chosen, such as the choices of way, of parking, of route, etc. taking into account the users distinguished into categories. Consequently, we have a list of probable future urban scenarios in which each term is associated with a value of probability which the expected projects should be able to attenuate congestion problems. This leads to a list where the scenario which corresponds to the projects having a higher probability of benefits are at first place. In our case it is important to underline that, among the analysed projects in the second step, a right importance has been given to the realization of fast collective transport system, to the central railway station node, the projects concerning it (linking road network and other intermodal stations), and to the parking facilities. We cannot leave these projects apart if we want to have good chances of reducing the congestion of the examined area. The third step goes on by associating each of the elements of the scenarios' scale and its attendant cost, which is the sum of the different aliquots of the different projects.

The *FOUR STEP* uses the methodology of the multi-criteria analysis which identifies the configurations for which the transport demand distribution is more convenient for the user, the manager and the environment. If we consider that decongestion is the user's and the environment's aim and that the less probable cost is the manager's aim we reach a compromise solution which can be expressed in a new list of the priorities of scenarios. This list can shift the terms of the previous list and define the final list which will be introduced to the policy makers for the opportune decision.

5.3 Second phase: the survey

The second phase aims to a successive list of priorities of ulterior support to the decision of the policy makers, produced by the judgement expressed by the final actor of the transport system, the transport user. By evaluating the benefits resulting from the realization of each project, the user makes a choice between the scenarios proposed, that is he gives each its convenience.

This phase may be discharged by a sample survey where each user is invited to express his own preference among the scenarios two by two taken. The procedure used to estimate the results chosen is the *conjoint choice method*, a *stated preferences* approach which is used when interviewees are asked to choose among two or more services described by a vector of attributes. The level of attributes varies through the alternatives so that the interviewees weigh up those attributes, each of them has a monetary remuneration and the marginal values of attributes may be estimated (Louviere et al., 2000).

In our case the survey is composed of four conjoint choice exercises in order to understand if there are decisive factors in the choice of the scenarios of project; why we choose a scenario rather than another and to which extent transport users are disposed to give an economic support to the mix of the proposed projects.

The survey was administered both in person by trained interviewers and by internet. Our sample is comprised of individuals resident in city of Bari (67%) and individuals resident in the cities of metropolitan area (33%).

5.3.1 Structure of the questionnaire

The interview begins with a short introduction in which the nature and the aim of the survey is described to respondents. The questionnaire is comprised of four section. The first section gathers specific information on the interviewed travel demand (mean, pur pose, trip timetable, etc.).

The second section is comprised of questions trough which the interviewed expresses an opinion on the transport system of metropolitan area of Bari. Section 2 provides information on congestion problem and describes subsequently the necessity to realize projects that can attenuate the trouble, improving the transport system.

Section 3 is comprised of three conjoint choice exercises. Firstly it is described the reason of the survey, that is to say the respondent is asked to give his/her opinion on the project plans of public administration to reduce congestion area. Each exercise describe two project configurations (Scenario A and Scenario B). Each scenario in its turn is described by eight attributes: (i) fast collective transport system; (ii) realization of the intermodal transport

nodes; (iii) capability to reduce the area congestion %; (iv) parking policy; (v) realization time of the scenario; (vi) other project I (urban corridor, new bypass road, state and provincial road network modernization); (vii) other project II (airport, port, intermodal terminal); (viii) special annual tax for 10 years. It is explained that the tax should garantee the repayment of total costs scenario for 30%, being the remaining 70% paid by public administration. It is different depending on individual is resident in city of Bari or in the cities of metropolitan area (in proportion of 1/3). In each choice exercise each scenario is described by the same mentioned eight attributes, but scenario A differs from scenario B in the level of two or more attributes. For each pair, the respondent is first asked which scenario he/she finds more better between A and B, and then he/she is asked to choose between A, B and the option of not partecipating in either scenario. *Figure 4* displays an example of conjoint choice question.

Finally, section 4 includes questions pertaining to the respondent's characteristics, such as age, sex, education, profession, household income.

5.3.2 The econometric model and the choice of regressors

Because of questionnaire characteristics (conjoint choice question) and obtained responses ("neither A nor B" responses is very scant), we have conducted the statistical analysis of the collected data with Logit binary model. We assume in the choose option the preference between scenario A and B is the dependent variable (Y). The observed variable is dicotomic (we consider "I prefer scenario A"=0, "I prefer scenario B"=1), and it is dependent on categorial and/or quantitative variables Xj (with c alternatives).

If we indicate with Pr the probability that alternative *h* (h=0,1) of Y is chosen by sample individual with j of X alternative is:

$$(1)\quad \Pr(\text{resp. } i \text{ chooses } h) = \exp(\mathbf{x}_j \beta) / \sum_{j=1}^{k} \exp(\mathbf{x}_j \beta)$$

where **x** is a vector j x k of explicative variables, β is a vector k x j of valued parameters. Equation (1) is the contribution to the likelihood in a Logit model, if the error terms ε are independent and identically distributed.

The identified variables as likely factors causing the logit probability are: KIND_TRAV, transport vehicle for travels; KIND_PARK, kind parking maked after travels; TIME_TRAV, average time for travels; FREQ_TRAV, travel frequency; H_TRAV, time daily band during which individual make travels; AGE, respondent age; GEN, gender; N.FAM, family number; TITLE, education; INC, household monthly gross income; AREA, respondent residence area. Subsequently it is used Log-linear model in order

to define in each choice exercise what factors are significant and if they are correlated.

SECTION C

Scenario choice

Now, we would like to ask you to choose between two project scenarios to reduce congestion in the metropolitan area of Bari. For each question, you will be described two scenarios and will be asked to choose which one you believe is better between these two scenarios, based on the characteristics of the scenarios.
In answering the following questions, please remember that the choice of the project scenario will involve the engagement from the pubblic administration top ut into effect such configuration for a solution of the area congestion and the payment of one special tax to delay in the corse of ten years. We repeat that this special tax would cover only a part of the total project costs, 30%, and not the total project costs. The tax would be proportion the family income. Please be assured that your answers will be kept strictly confidential.

CHIOCE 1

Attributes	**Scenario A**	**Scenario B**
Fast collective transport system	4 Underground lines 1°level 1 Underground lines 2°level	4 Light railway lines 1°level 1 Light railway lines 2°level
Realization of the intermodal transport nodes	Central railway station node S. Pasquale South, Palese, Industrial Zone, Torre a Mare nodes Secondary nodes	Central railway station node – Secondary nodes
Capability to reduce the area congestion %	85%	65%
Parking policy	Central underground parkings Intermediate underground parkings Suburban parking facilities	Central underground parkings – Suburban parking facilities
Realization time	Long	Medium
Other projetes I	Urban corridor New bypass road State and provincial road network modernization	– New bypass road State and provincial road network modernization
Other projects II	Airport Port Intermodal terminal	– Port –
Special annual tax for 10 years	€ 475 (€ 150)	€ 200 (€ 68)

Which scenario do you find better between A and B?

A □ B □

If you were choose between A, B, and the optino of not particièating in either of the two scenarios, which wolud you choose?

A □ B □ Neither □

Figure 4. Example of choice question

5.3.3 Results

The majority of the respondents were males, and the average age was 35. The respondents were medium-highly educated: the majority (49,3%) had a secondary school-leaving certificate and about 10% of the sample had a college degree. The majority of respondents were students (31,3%) or employees (23,5%). The family was constituted of 2-4 components having a high monthly income, because 60,4% of respondents stated to have a salary between €1.000,00 - €2.000,00.

By analysing data related the three conjoint choice exercises, we observe the preference among all proposed scenarios is: A_1 - 61,9%, B_1 - 38,1%, A_2 – 51%, B_2 – 48,8%, A_3 – 49,5%, B_3 – 50,5%. We can observe scenario A_1 has the higher preference, even if it is characterized from the higher annual tax, followed by scenario A_2 that differs for about 10 per cent points; on the contrary the difference among the other scenario preference is of little

importance. Finally, we can organize a list of scenarios by means of these choice preference.

In addition by analysing Logit model results we note that in the first conjoint exercise H_TRAV is the only significant variable (P value= 0,0234) for the probability of choicing, while the other variables are insignificant. In the other two choice exercises we can verify variables are insignificant too.

5.4 Third phase: the final choice

The final decision of which project scenario to adopt in order to attenuate the congestion of metropolitan area of Bari is due to the public administration.

The policy makers can found their choice on the base of results obtained from the combined action of simulation techniques and conjoint choice procedure (sample survey). In the other words they can compare the project scenario list obtained from multicriteria analysis (1° phase methodology) with scenario list obtained from choice preferences of conjoint choice exercises (2° phase methodology) with the aim to identify the better configuration.

It is important to point out that the results produced by the methodology we have described are an instrument of support in decision and, independently from the results obtained according to economic, social and politic considerations we do not lie with, policy makers may decide.

6. CONCLUSION

The evaluation of possible “future”transport system which could reduce the effects of the network congestion on an urban area occurs by using the results of simulation methodologies which through the multi-modal stochastic equilibrium assignement methodology allow to define the optimal distribution of the transport demand between public and private way.

Starting from the current evaluation procedure in order to complete the proceedings to submit transport projects to public administration, this study describes another methodology aimed to carry out evaluation of alternative project scenarios as solution to urban congestion, by using transport user information and opinion.

In order to point out the capacity and effectiveness of the proposed approach, the methodology has been applied to the metropolitan area of Bari, with the aim of valuing the most convenient transport system taking in consideration user stated preferences too in relation to the attributes of the proposed project scenario and from they perceived. The developed survey

shows the respondents indicated their own choice preferences apart from economic characteristics of scenarios, giving, on the contrary, more importance to the progectual and qualitatives ones.

Hence, the proposed methodology supports the public administration in a better transport system planning, because it allows policy makers to obtain realistic indication compared with planning based on the valuation of theoretical supposed preferences by using users' behaviour and preferences. In fact, individual valuation supplies useful informations on successful probability of a fixed decongestion project, on willing to pay this project too, as well as the value which the individual assign the project to adopt.

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