

The Functional Requalification Of A Transport Infrastructural System: Objectives, Criteria And Intervention Priorities.

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Synopsis

It can be said that, despite the clear need of a general modal readjustment of the transport system, road infrastructures will continue to absorb the majority of the movements of passengers and goods, at least in the short-middle term. This forecast will be predictable till the lacks that have contributed to determine the success of road transport are corrected. Therefore, we need to solve problems of management and adjustment of the existing road net, that are particularly important, both for the effects induced on the production system and for the consequences they determine from a social and environmental point of view. Hence the need to proceed to a functional redevelopment of the existing road net, a net that distinguishes the territorial functions and the functions accomplished, within the road net one belongs to, by road connections, ensuring an equal offer and level of service.

The guidelines of the redevelopment interventions that have been proposed are as follows:

- a) the transport system and its road net must be adjusted to the social-economic situation of the territory and to its development principles and must respect, safeguard and enhance the peculiar historical-environmental realities, in harmony with a general economic planning. The planning of the transport system should correspond to a global vision of the economic development process in which the intervention is placed: the planning of a road doesn't have an independent configuration, it is an integral part of the territorial planning;
- b) every component of the system plays a role that corresponds to its technical and economic characteristics and all the components, hierarchically organized, contribute to define the functional territorial structure to the prearranged social-economic structure. The definition of such integrated system must be achieved through the optimization of the available resources, paying great attention to the use and reuse of those that already exist on the territory;
- c) the transport system must be used to manage the localization of the activities, that is the crux, not only of town-planning problems, but also of those concerning traffic.

Undoubtedly, the objectives of an intervention programme on an infrastructural system must be the following:

- road safety;
- connectivity and level of service of the road net;
- cost-effectiveness of the intervention;
- equal distribution of road system services, inside a given territory.

In order to pursue integration and intermodality, the functional redevelopment must be aimed at achieving the connectivity of the infrastructural system for the followings reasons:

- the increase in the connectivity of transport networks is fundamental to support the formation of a more reticular territorial structure and to achieve a better distribution of the development;
- changes in the connectivity, due to an unequal development of transports, are the cause of some of the main obstacles and penalizations that interfere with the distribution of the development.

It can be said that a hypothesis of management of an existing road system that includes:

- interventions of ordinary maintenance;
- interventions of extraordinary maintenance;
- new works, aimed at providing the infrastructural system with integration and intermodality,

has to refer to the above-mentioned basic concepts and objectives.

The work that is being proposed deals with those issues and aims at explaining its contents as well as giving answers, specifying the objectives, the intervention criteria and a possible method to define the priorities.

The Functional Requalification Of A Infrastructural System Of Transport: Objectives, Criteria And Intervention Priorities.

More and more frequently, they emphasise the recognition that, among the phenomena that characterise our era, the mobility of people and goods is considered the expressions of an inalienable right. However, mobility is a phenomenon that assumed aspects so extreme to inspire worried analyses and to stimulate urgent reflections both in the public and private sphere. It concerns mainly the most evident aspects of the mobility linked to the vehicular traffic: the traffic congestions, the incidence on the pre-existing natural environments, the increase in tragic road accidents.

Understanding the phenomenon of the mobility means not just to observe it from the outside: it is necessary to gather the various and articulated causes of mobility, which can be due to both economic and existential reasons. We must focus our attention on these profound aspects, to the users' needs, to the capacity of the infrastructural systems available, to a proper use of technologies, in order to reduce the waste of non-renewable resources [Annunziata F. (1980)].

The socio-economic development is always characterised by a growing need of mobility for people, goods and information. The subsequent demand for transportation follows the size and location of the residential settlements, the productive and service installations, the general demographic, economic, cultural and civil evolution.

The need of mobility of people and goods is one of the most important incentive factors of the development of the economy of the Country. It has been met mainly with road and motorway infrastructures. Our Country has an infrastructure of 155.254 km of primary roads (including motorways, main roads and provincial roads) and 668.673 km of unclassified roads [Minister of Infrastructures and Transports, (2002)]. As for motorways, it has a territorial density of 21,5 km/1000 km², inferior to the values registered in Belgium (56,6 km/1000 km²), in Netherlands (54,9 km/1000 km²), in Luxembourg (48,7 km/1000 km²) and in Germany (33,7 km/1000 km²). On the other hand, for what it concerns the figures of vehicular density, Italy with 78,4 veic/km exceeds the European average (46,6 veic/km) and together with Germany (77 veic/km) and the United Kingdom (77,1 veic/km) registers the highest values [Autostrade s.p.a. (2004)].

Reading this few data, and the others collected and processed by governments and companies concerned with the transport system, which do not indicate any important turnaround, what strikes the most is the need for a different distribution of the transport of people and goods. It is not necessary that the development of new transports should be followed by a development, rather than an adjustment, of the Italian road network. The response to the demand for transport is, and will be, even in the short-term future, possibly met with the resources currently available, which consistency has been stuck for many years. The demand is also met with some 300.000 km of road network, with 10.000 km of electric railway network: in 30 years the development of the railway network has been less than 1%, and this strengthened the imbalances which have historical roots and penalise remarkably the Southern part of Italy, as it can be seen if we consider the extension of the double track lines or the percentage of the electric railway network.

When there is a general approval of the opportunity of rearranging the transport functions through the transfer of an important part of the flows on alternative systems, railways, for instance, show a limited capability of getting new market shares, especially in the commodity sector. An important contribution can be offered by transports by water, as it has been demonstrated by some recent trends of some national slips. Yet we have to fear that these dynamics of development can be mortified by the growing congestion of the costal inlands and by the delays accumulated in building inter-harbour facilities capable of functioning systematically.

The General Plan of Transports is mainly aimed at balancing the system generally. However, it is necessary that such balancing policies are directed to correct in other ways the deficiencies that concurred to determine the success of transport by road. In fact, the reasons for such a huge spread of it are different, but the most important is the freedom that the driver has. When the transport by road works well, the driver can freely decide the time of departure, the route, the travelling speed, when to stop over. Moreover, the driver goes straight from the departure place to the destination place, without unpleasant and expensive nuisances, as usually happens with other means. This freedom, which is the main advantage of transport by road and its peculiar feature, at the same time is the cause of its negative aspects and determines its validity limits. In fact, the driver freedom brings together a series of aleatory elements in road circulation.

The designer must take into account statistically these elements, referring to an interval within the driver is likely to behave. The drivers who come from this interval determine a series of negative consequences. The

most severe of them is certainly set by car accidents. In addition to the dispersion of the driver behaviour, the variety of vehicles creates reciprocal conditioning among the same vehicles, which increase with the growth of a car flow travelling on a road.

In many cases, some design and building faults caused the existing infrastructures not to be able to meet the demand in a satisfactory way, at a safety level: it appeared as an intrinsic deficiency of the road system. On the contrary, it is clear that the transport by road, as all the other systems, has precise usage limits, but considering them, it results the most convenient. The designers have the task to identify, in each case, what happens if these limits are overcome, comparing to a road infrastructure, which can be able to ensure a given service level with other means of transport of the same efficiency. The central point of the choice among the different ways is to identify the features that each of them must have to meet the demand.

Therefore, it is easy to see that in the short-medium term, road infrastructures will be the ones to get the most part of the movement of people and goods. This brings some management problems and adjustments problems of the trade capital, which become particularly important both for the effects on the production system and the consequences on the society and the environment.

Another data that characterizes the Italian situation of transport by road is the fact that the 50% of the ordinary road network needs to be adapted to the modern planning criteria and that the greatest dangerousness in accidents can be found on the ordinary interurban road system. The 50% of the roads, which are in poor conditions, are located in Southern Italy and in the Islands. However, they constitute only one third of the whole network. Because of this, for the maintenance of the ordinary network they are given resources equal to two per thousand of the capital value, neatly under the European average, equal to ten per thousand: so it is necessary to preserve the integrity of the existing capital. [Annunziata F. (1990), Annunziata F. (1991), Annunziata F. (1992)].

Therefore, it is more and more emphasised the need for a functional requalification [Annunziata F., Maltinti F. (2002), Annunziata F., Maltinti F. (2004), Annunziata F., Pinna F. (1999),], of the existing network as part of the management of the infrastructural trade capital. However, the requalification programmes of the Italian road system seem to underestimate this necessity, despite the aims set:

- the safety, in order to reduce the 50% of the mortality caused by road accidents, according to the EU guidelines;
- the connectivity and level of the network service;
- the economic efficiency of the intervention;
- the equity of the distribution of the road system service in the national territory.

It is likely that even this depended on the given scenery, strongly directed to reduce the demand for transport by road, in the utopian case that the growth of the whole demand will be met in other ways, which should double their transport offer.

THE FUNCTIONAL REQUALIFICATION OF THE ROADS: INTERVENTION OBJECTIVES AND CRITERIA

In a broad part of our country, especially in the southern regions and in the islands, the road network represents the actual opportunity for mobility, connecting zones and countries and representing the only possibility to access huge areas. On the other hand, the road network often represents, in a society more and more characterised by a growing mobility, the weakest link of a production chain with subsequent negative conditionings on the competitiveness of the local entrepreneurial class and with obvious consequences on the society [Annunziata F., Coni M., Maltinti F., Pinna F., Portas S. (2002), Annunziata F., Cottone L., (1989), Annunziata F., Cottone L., Mura G., Rocca G., Urru I. (1990)].

The problems connected to mobility require an innovative and original effort compared to the only visual attention to the traditional layouts, able to gather exhaustively and co-ordinately the current and future needs of mobility to propose guidelines, programmes, intervention priorities, both for the definition of new proposal and the preservation and improvement of the current road network.

The transport system and the road network must be adapted to the socio-economic realities of the country and to its development guidelines, always preserving and valorising particular historical and environmental situations, and in concordance with the overall economic planning. So it is necessary the functional requalification of the road system: rebuilding a network system distinguishing the territorial functions and the performed functions in a specific road network of the various links, ensuring a homogeneity of the offer and an interesting service level for the local, provincial, regional and interregional infrastructures.

Only at a basis of the rebuilding of a infrastructural design coherent to the needs of the demand, it is possible to think of an intervention planning to guarantee the best relation benefits/costs. In this regard, it is determinant the definition of a picture of objective priorities which take into account:

- the role given to each route in the network and its efficiency, considering the service provided, the safety and the environmental criticalities that characterise it;
- the kind of intervention of adaptation necessary, in order to evaluate the overall programmes, taking organic actions to guarantee important economy of scale respectful of homogeneous performance

standards;

- the dynamics of the current processes, on which depend the laws of functional obsolescence to identify the best lapse of time for intervene to guarantee limited intervention costs through the residual recovery of the infrastructures.

The planning must ensure safety levels compatible with the traffic flows and their type composition, not to mention all those needs of environmental preservation concerning both the planning cohesions and the impact levels on the territory. In a programme for reordering the mobility functions the route plays a key role, in a network context, because it determines its physical features. This logic concerns also the planning of the maintenance, aimed at preserving resources, in order to offer a determined level of service, with adequate safety levels: the main objective is not to meet the requirements, but to satisfy the customer through the prevention of non conformity.

The decree of the Minister of Infrastructures and Transports (5/11/2001) regulates the elements related to the features of a road plan, connected to the functions that they must perform according to the territorial planning, especially in the transport sector. Therefore, the functional requalification must start with the attribution of specific tasks to the single elements of the network: it is necessary the definition of a method for classifying the existing roads, implying a general planning or a sectoral one with infrastructural specifications (Transport Plans), or other means for the Plan. The aim of classifying is to uniform in a specific territory, the features of the different types of roads. The classification is a check for the validity of the functional hierarchization of the roads, identified by one of the Plans mentioned. The functional qualification of the road is also based on the different users and the activities allowed, considering the environment in which the roads are.

This affirmation implies that the technical choices for the road planning are strongly influenced by the physical and anthropic features of the places, apart from the environment quality of reference. It also implies that the classification of the road network (and therefore the territorial and/or sector planning) is the result of the analysis of the environmental features of the territory covered, to be carried out through preliminary planning activities of the road network. Therefore, it is necessary to start an integrated planning layout, an interactive process that subordinates the technical choices, even for the classification, to the check of the induced effects, in order to seek the best compromise among functional, economic and environmental needs, to guarantee the best impact balance.

It is certainly a heritage of the modern planning culture the idea of a safe road, a road that guarantees adequate service levels during all its usage life, and that is sustainable by the territory covered. The result of the planning layout is that the roads, with their volumes, their works of art, their routes, become an environment within the pre-existent environment, and an element of enhancement and enrichment. The integrated planning, with its transformation during the planning stage, in designing a road at the different levels, even if when it is about adapting existing roads, with its capability of involving and convincing the interested communities, is a sure method when they want to harmonise nature and artefacts, mechanics and safety, costs and benefits, beauty and statics [Maltinti F., Annunziata F. (2004)].

By this time, it is spreading the assent to the fact that the safety of the circulation in one of the inalienable aims to improve the quality of life [Annunziata F., De Lorenzo A. (1982), Annunziata F., De Lorenzo A., Dolci P.V. (1984), Annunziata F., De Lorenzo A., Lupi E. (1984), Annunziata F., De Lorenzo A., Lupi E., Passa E. (1985), Pinna F., Annunziata F., (1998), Pinna F., Coni M., Annunziata F. (1997)].

A mean of transport by road is defined, not only by the features of the vehicle and the traction system, but mainly by the rules according to which the physical room of the infrastructure is used, on which depend the safety and the reliability of the system. These are directly proportional to the freedom of usage given to every single vehicle: therefore they are minimal in an ordinary two-way road and they are maximal in the railway system, and in the same system they decrease, in an equal situation, with the increase in the vehicular flow.

On the other hand, the stricter the control of the use of the infrastructure, the higher the costs of building and of the working of the transport system. The comparison between these costs and its benefits, for what it concerns safety and reliability, defines, in the different situations, the parts of the demand which belong to each system.

Regarding the road, the improvement of the infrastructure and the possible introduction of particular check systems for the traffic can help the driver to evaluate the features of the transport system, and thus to reduce the likelihood of accidents. Anyway, it is important to keep in mind that, preliminary to the definition and the evaluation of the interventions, the parts involved in safety:

- man, with their driving behaviour,
- the vehicle, with its technological features;
- the road, both for its building features and armour for the regulation of the traffic

have individually reached different security levels and therefore they are not uniform.

A first conclusion is that it is necessary to bring the various element to the same safety level, approaching the different standards to each other, examining the relations among the parts, which, as yet, have been exhaustively examined. There is still a lot to do for what it concerns the situations of the driver and the road. The latter must not be considered only as a surface on which the vehicles travel, but as the environment in which vehicles move and which both vehicle and driver interact with: if the drivers travel in a tidy environment

and from which they receive clear signs to behave, they are certainly induced to behave the best.

One safety essential element is undoubtedly represented by the travel signs. Yet, it is important to get rid of the principle that characterises the circulation of road vehicles, i.e. their motion can only be regulated at sight. It is required to develop the most all those techniques of automatic information that inform the driver about particular conditions of sight, dangerousness, traffic, and helping them make a decision too.

Thus, it is needed to start a safety action plan, based on an integrated approach on the global system involving man, the vehicle and the road, carrying out actions at information, regulatory and research levels.

Anyway, we can assert that the objective of "safety in circulation" is to build an intrinsically safe road, even when it is about adapting existing roads. A road is intrinsically safe, for instance, if it has the following features:

- geometry of the layout: the radius of curvature, both horizontal and vertical, the longitudinal and transversal inclinations must be compatible among them and they must be adequate to the speed of the project;
- the sight distance on every element of the layout must be proportional to the speed of the project, and match the most the one that determines adequate levels of service;
- the crossings and the entries must be regulated and visible from a proper safety distance;
- the road surfaces must be characterised by adhesion coefficients that allow to keep the driving conditions, even in environmental conditions critical on the average;
- the lateral ditches must not be deep and with built-in section;
- the slopes must not be too much steep;
- the carriageways must be separated by adequate spaces or devices to allow the vehicle in diversion to stop before occupying the opposite lane;
- the fixed and detected obstacles must be adequately separated by the vehicle flow.

One of the most recurrent interventions, when they want to adapt the safety conditions of the circulation on a road, is the placement of retention devices. In the light of the above mentioned considerations, it is clearly necessary that such activity becomes a part of a programme for adapting the trade capital and for the functional requalification of the existing road network.

The extent of the road network not always met the different territorial needs because they were built following sectoral needs and demands, rather than an overall planning, and thus an overall planning of the interventions.

An important objective that it can be given to the planning of the system of transport, especially concerning the road network, is to cut the economic cost of the transport, to improve service and safety levels, in order to increase the territorial accessibility.

The accessibility, meant as the "facility of access" to a precise place, is a feature of the opportunities of transport at the service of a specific place and does not take into consideration the houses, the services, the work places surrounding it, which make it propitious to meet a concrete demand of transport. A different interpretation of accessibility is not necessary in the traditional procedure for the planning of the transport system, according to which the dimensioning and the choice of alternative services or layouts follows the analysis and the prevision of the demand for mobility, in order to guarantee, after an adequate comparison between the demand and the offer, the accessibility to the various centres to the users who want to get there. This way of proceeding, the impossibility or the difficulty to quantify the demand, forbids a well-thought choice of interventions on the transport system and vice versa imposes to proceed following general value logics (to guarantee the connections among all the centres, to distinguish functionally the lines of communication, to uniform the features of the infrastructures along the main routes, and so on) and/or to replace with other data (on population, location of the services, the work places, etc.) the lack of information about mobility.

The traditional planning procedures is endangered when it has to arrange a Plan for developing areas, or low demographic density areas, although characterised by the presence of medium-large urban concentrations. In fact, in a case like this, on the one hand the future demand for transport, also because of socio-economic development sceneries not completely defined, can hardly be foreseen, thus it is very difficult to dimension the communication system. On the other hand, the entity of such demand can be included, even in part, in values inferior to the minimum threshold of capacity of elementary facilities (roads and/or car services for public transport). Therefore, it is not the entity of the demand that can be binding for the choices, but rather more articulated considerations, connected to the level of quality of life that can be guaranteed into the limits of the balance, which bind both the investments on transport and the location and dimensioning of houses, work places and services.

An essential element for a good quality of life is the availability of job opportunities, of higher level services, of chance of meeting. In developing areas, or low settlement density areas, although characterised by the presence of medium-large urban concentrations, such activities are concentrated in few "poles", unless they want to overemphasize them compared to the citizens needs, bearing, obviously, the diseconomies. In order to put this "poles" concretely at people's disposal, it is necessary to make the travel to reach them economic, fast, safe, comfortable: in short, it is necessary to improve the accessibility.

Therefore, accessibility and quality of life form a binomial, which is indissoluble in low demographic density

areas: accessibility can become a valid support in defining the intervention priorities for the transport system. The analysis of the road network must be based on considering the fact that the territories of our country are characterised by a marked organization of "poles" of the production activities and services: because of this we have long distance transports. Moreover, the availability of job opportunities, of social and cultural opportunities of higher levels, of access to services nationwide, concentrated in few "poles" is the reason why many people move to "strong" areas. It is evident that enjoying economic and socio-cultural opportunities, which tend to concentrate in precise areas, is bound to the facility of access to the mentioned areas. On the other hand, it is important to emphasise that, conversely, the presence of an adequate transport system creates the structural conditions to begin a more homogenous territorial distribution of the job opportunities and of the service facilities.

The main objective of the planning of the road system is to design an organic system capable of creating adequate conditions of accessibility to improve the economic conditions and the general living conditions of the inhabitants. The main problem is understanding which correspondence exists between road network and the demand created by the current and future assets of the settlements, by the modification of the productive assets, by the necessity to ensure an adequate road support to tourism, and so on. Thus, the interventions on the road system are not neutral regarding the structure of the phenomena they face and from which the reasons and the meanings. The dislocation of the settlements (residential, productive and of service), the mobility, the capability of attraction, in short the overall function of an area, are strongly influenced by the type of internal and external road structure that supports them.

Therefore, it is needed to start with an analysis of the current situation (which balance exists nowadays between demand and offer of transport), to pass to an analysis of likely sceneries: which future balance, related both to the independent expansions of social and economic phenomena linked to the road network, and to the changes that a different system of communication can generate.

The demand for territorial accessibility, which results from the analyses of the current asset of the territory, under the economic and social profile, is expressed from the one hand by the demands of the population, from the other hand by the needs of the productive sector. It must taken into account the opportunity of enhancement and strengthening economic resources, and the preservation of landscape and environmental important areas.

These different needs express the general necessity for the requalification and realignment of the use of the resources of a territory where some "strong" areas tend to influence the development of the surrounding areas and from where to study the contrast between "development poles" and huge parts of the territory which are definitely marginalized.

The strategic objective proposed by the planning of the transport system is the territorial realignment that, recognising the high risk deriving from the abandonment and marginalization phenomena of huge areas of the territory, leads to consider the choices within a programme that at same time tends to rationalize and strengthen the "strong poles", but which contributes to "mend" the depopulation areas.

Obviously, we cannot think that the interventions on the road network all by themselves can face and solve the realignment problems, but they can and must be considered combined to adequate territorial policies, both for the location of the civil services, the companies and the production, and the environment and the general city planning. In this regard, the reorganization of the road network can have a remarkable strategic role in order to rationalise what already exists, enhance and incentive a form of development proper to the interested territory.

The main problem for the territorial realignment is the recover of the internal areas. The chronic backwardness of these areas is mainly due to their outer location and to the limited accessibility. Therefore, a series of vast interventions on the internal road network and a strong system of connections with the main urban and productive settlements can play a fundamental role in the reutilization of these territories and their recover through an economic development based on the enhancement of the natural, cultural, agricultural and handmade resources.

To solve this problem we have to take into account also:

- the elimination of the strong discomfort of these areas using the main social and economic services concentrated in a reduced number of "poles";
- the creation, through closer connections among the service centres, of efficient communication channels, capable of determining a road structure that can be a reference point for the minor settlements, to supply the province capital.

From a historical point of view, the study of the dynamics of enhancement of many economic systems has shown that that investments in the transport sector are often decisive factors in the development of the capital. In developing regions, however, we can see that the economic growth rate stays low, despite the investments in the transport sector. This phenomenon, which has been observed in many cases and in Italy too, in the southern regions and in the islands, despite the interventions were piloted, brings to the conclusion that the investments in the transport sector represent a necessary condition, but not sufficient for the development of a specific geographic area.

The critical moment of the take-off of the economy of a region is represented, as it is known, by the transition from the subsistence stage, in which the exchanges take place in a restricted area, to the production of an

agricultural and/or industrial and/or mining surplus stage. In order to let this transition occur correctly, they need important structural transformations in which the creation or the transformation of a road network must be coordinated with investments for its growth.

From this derives the consequence that certain traditional procedures of evaluation of the convenience of the investment plans, for instance on the road system, do not correspond to the objective to promote a balanced growth. In fact, in various applications, they led to the creation of overemphasize works, taking resources to more pressing projects for the development. In this regard, we do not have to forget that one of the features of the developing regions is that of a strong economic dualism, which means that huge poor and scarcely populated areas are opposed to restricted growing areas (generally, the main cities and their hinterland) characterised by high levels of income and strong developing rates.

It is clear that under these conditions, founding the priorities of the investments only referring to the "direct benefits" (because of the reduction of the operative costs), they run the risk of worsening the situation, emphasising the peculiar inconveniences of the medium-large urban areas. It is necessary to abandon a mere sectoral vision of the problem of the road planning and of the transports, and this could be done only by introducing in the analyses then so called "development benefits". This range of benefits must be considered as the result of the global investment, or rather of the whole productive effort, and not as the effect of partial investments such as the roads.

From these considerations we have some guide-criteria of the interventions of requalification of an infrastructural network. First of all, there is the need of facing the planning of the transport system with a global vision of the economic development process where the intervention acts: the planning of a road or a railway does not have an independent configuration, but must be considered an integrating part of the territorial planning. The basic concept that must be asserted is that every element of the transport has a role correspondent to its technical and economical peculiarities, and every element hierarchically organised takes part to the definition that territorial asset functional to the prefixed socio-economic asset. The definition of such integrated system must be reached following the aim of optimising the available resources, paying attention to the use and reuse of the existing ones.

Another concept that must be taken into consideration is that the transport system must be used to rule the location of the activities on the territory, which is the crux of urban and territorial problems and also of those related to the traffic and circulation. For the evaluation of the territorial assets linked to the interventions on the transport system, the connectivity has a key role, at least for the following reasons:

- the increase in the connectivity of the transport networks is the fundamental condition to back a more territorially reticular structure, for the development to expand;
- to the variations of connectivity due to an unequal development of transports can be referred some of the main constrictions and penalizations that stop the development.

The planning of the transport system must be based on some main options:

- to analyse adequately the possibility to requalify the intercity connection network relied on the ordinary road conditions with investments aimed at decongesting the overloaded areas, offering a better diffusion of the connectivity and accessibility values;
- to verify the hypothesis of improving the connections of the minor urban systems to the "strong" areas, using more efficient local transport services for what it concerns reliability and degree of the service.

Regarding the organization of the urban areas it seems particularly interesting [Annunziata F. (1991)]:

- to deepen the possibility if encouraging the mobility from the private transport to the public one, checking the reachable threshold and the city planning implications;
- exploring the possibilities and the implications of the strategies of the organisation of the main railway junctions for the regional and metropolitan mobility, both for what it concerns distribution of the accessibility values, which should back a reticular evolution of the settlement assets and the working models.

Finally, the productive sectors, in order to carry out their duties efficiently and competitively, need a transport system of high levels of efficiency, safety and fastness. The spontaneous, occasional and partial responses to these needs did not lead, and it is unlikely that they could do so, to a transport system with modern technological and organizational features. So, it is necessary to plan the public intervention in the transport sector: all the main interventions in the sector, both those linked to the functioning, reorganization and the renewal of the offer of the existing transport, and those related to the strengthening of the offer, must be studied, defined, proposed according to a new method of organizing the system of the decision of the transports. It must permit that the interventions, and therefore the relative expenses, to be coherent at any level, to concern necessities of expenses that come from reliable previsions of the needs of a developing economic system, to be done at the proper time according to a priority scheme that can avoid unacceptable delays in the expenses or unuseful anticipations on the needs, in a view of integrations of the various ways, globalising the expense nowadays wasted and optimising the use of the resources.

THE FUNCTIONAL REQUALIFICATION OF THE ROADS: HOW AND WHEN INTERVENE

Regarding what mentioned above, it is clear that are considered prevalent objectives of a plan of functional requalification of a road network:

- to realise safety conditions for the circulation;
- to give the network connectivity features for what it concerns the transport system to which belongs.

Therefore, the interventions of maintenance, adaptation and of new creations must be aimed at meet these objectives. In this regard, it is appropriate to clarify the contents of the mentioned interventions.

When the objective is the maintenance of the safety conditions of the circulation, contemplated during the planning stage, it is consider ordinary maintenance: interventions that do not modify the original plan that, preserving or restoring the good, give it the features anticipated during its creation, for its usage life. Thus, for instance, we can consider interventions on:

- the traffic signs, which must be changed, to be adapted to the regulatory framework;
- the functional features of the road surfaces;
- the hydraulic works, to be adapted in the hydraulic sections, because of the changed environmental conditions;
- the traffic islands, to be substituted to be adapted to the regulatory framework;
- all the marginal elements of the platform;
- etc.

Therefore, the ordinary maintenance concerns a road that already has the features of the intrinsic safety.

When the aim is to improve the safety conditions and the stream conditions, as initial stages of a procedure of functional requalification, it is thought that it can be considered extraordinary maintenance: interventions aimed at the adaptation of the functionality of the road heritage, which become an improvement of the stream, in equal prevision of usage life, through modifications of the geometric and planning features, which with the same capacity, produce a minor variation of the speed of the vehicular stream as the latter varies.

This interventions can be, for instance:

- the correction of the distance of the sight in a curve;
- the insertion of curves of transit, without any variation in the polygonal of the axis;
- the introduction all those features that are needed to build an intrinsically safe road.

Therefore, it follows that, where we want to improve the safety conditions in circulation in an existing road, they should do extraordinary maintenance interventions.

Finally, the functional requalification interventions, obtained by realizing and/or finishing new works and/or elementary networks, correspond to the main objective of:

- solving particular criticalities and/or detected, in order to improve the conditions of accessibility to the territory;
- realising an integrated and intermodal system, ensuring the connections among the various methods of transport.

In this case, the functional requalification of the existing infrastructural heritage could include the adaptation of the geometric and planning features of existing layouts, also with relevant variations of the layouts. They will be the result of the three levels of planning, including the studies on the environmental impact, the different degrees of elaboration, whether the kinds of roads and/or the features of the territories covered require them.

Thus, in short, we think that the integrated project procedure must be articulated in:

- preliminary project;
- definitive project;
- executive project,

When it is about realising and/or finishing new works and/or elementary networks. It must only include:

- definitive project;
- executive project,

When it is about extraordinary maintenance interventions. Consequently, the interventions of environmental mitigation can be present only in the definitive and executive stages, and not always in both, when we have to consider:

- ordinary maintenance interventions;
- adaptation interventions, which do not require relevant variations of the layout;
- roads in the urban area, as part of the requalification projects and/or as part of the equipment of the urban area;
- every time that the typology of the road and/or the territorial features do not require a specific study on the environmental impact.

We already took into account the fact that a picture of objective priorities, which cannot be defined, must

consider:

- the role given to each route within the network context and its efficiency, from the provided service viewpoint, of the safety of its functioning and of the environmental criticalities that distinguish it;
- the typology of the interventions of adaptations necessary, in order to evaluate the overall programmes, managing organic actions that could allow important economies of scale respectful of homogenous performance standards;
- the dynamics of the current processes, from which depend the obsolescence functional laws, to identify the best lapse of time for intervene in order to guarantee the reduction of the costs through the residual recover of the infrastructure.

Considering what we have said above, we can say that the priority interventions must be of ordinary and extraordinary maintenance, for the preservation and the improvement of the safety conditions of circulation, adopting specific guidelines from the European Union. Regarding them, the priority among the different stretches of road will depend on the mentioned parameters. On this, it will also depend the priority order for what it concerns the finishing interventions and/or new realisations of single road tracts and/or elementary networks when they want mainly to reorganise the territory and/or build an intermodal and integrated system to realise the functional interconnections and complementarities among the several junctions/infrastructures of transport.

Finally, to better explain what we already said about the definition of the priority criteria, we can affirm that the guidelines of the law n° 109/1994, which articulates the planning in three levels of subsequent technical elaborations, must be reconsidered because it seems restrictive to reduce the design of a road only to its axis. If the road design is a relevant part of a reorganisation/restructuring plan of a specific territory, for the improvement of the accessibility conditions, apart from giving to the road the features of a intrinsically safe road, it is appropriate to extend the planning to all those elements of the network that ensure the interconnection with the other routes that complete the elementary system, which has the same functions of the examined layout. In other words, this means that planning a considered route, each time, and with the branches for the immediate interconnection with the other routes of the same hierarchic level or at a immediate inferior/superior level. Especially for a road that belongs to the "primary" network and/or to the "principal" one (motorways and/or main roads), there is the need for the preliminary project to be extended for the requalification of the existing road network, which develops to the service of the region interested by the main route and functionally integrated to the latter.

If the aim of the planning is to identify the best compromising solution for the functional, economical and environmental needs the infrastructure must meet, the objective must be also to ensure that the service provided by the road is constant, despite any particular severe accident, critical weather conditions, etc.

It is convenient to identify in the road network that flows to the same direction of the main route that/those road/s that can be adequate, also through extraordinary maintenance interventions, to the function of support to the road conditions on which direct, although with lower levels of service, the mobility which would be penalised by the critical conditions of the main road. It would not be realistic to assume that a motorway that passes through orographically hilly and/or mountainous areas could not be exposed to critical weather conditions, and therefore could not function properly. Anyway, it can be considered, attentively, the design of "supporting" routes which cross areas less exposed to critical weather conditions and on which direct a part of the traffic flow, in order to ease the traffic conditions on the main road.

The strengthening of the superstructures and of the works of art, the adaptation of the transversal sections, slight variations of the layout can be interventional elements, in the "supporting" routes, which should be planned together with the dimensioning of the main road. As well as the interconnections should be planned between the two routes to facilitate the use and the management of the elementary road system established. Another element of safe and comfortable management of the supposed road system is the development of techniques of automatic information (for instance, signs with changeable messages), which can inform the drivers about particular conditions of sight, danger, congestion, and aiding them, even to make decisions.

In the light of these considerations, it is necessary to update the concept of preliminary project of a road: not only the project of a passageway, or different alternatives to it, but the design of an elementary road system, in which, next to the considered route in a project of territorial reorganisation, they identify a "supporting" passageway, with connection branches, in order to keep the connections of the main route, even in particular critical conditions.

Finally, the preliminary project of the main route should comprehend the arrangement of information driving systems for the user, since nowadays it is necessary to definitely get rid of the principle that distinguishes the circulation of the road vehicles, also for the "principal" road network, i.e. their motion can be only regulated at sight, relying mainly to the road markings and the road signs.

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