MOBILITY AND ENVIRONMENT : IS IT POSSIBLE TO TRANSFER WESTERN MOBILITY PATTERNS TO THE EMERGING COUNTRIES ? SCENARIOS ON MOBILITY AND THE CAR INDUSTRY

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MOBILITY AS A PRODUCT: AN HISTORICAL DIGRESSION AND SOME SOCIO ECONOMIC CONCEPTS

One of the profound traits of our condition as moderns is the conquest of personal mobility as a social good, progressively widened to all the social classes. The years during which the modern world was being shaped, according to the historians, i.e. between 1815 and 1830, saw the conclusion of the transport revolution. At the end of the decade between 1820 and 1830 both Paris and London disposed of efficiently organised public transport systems - still based on horses -: the omnibuses. We will use a quotation from Paul Johnson which aptly introduces our point: «With the invention of the omnibus, everyone has his own carriage, and how cheap it is! The bane of the domestic servants has come to an end, along with the cost of their liveries, the bills of the coach-builders and the veterinary surgeons, the need to keep our fellow creatures waiting for us in the cold of the night or in the rain, while in the hall there is a bustle of dancing or another hour is being spent taking one's leave in a leisurely fashion before the glowing hearth. We needn't concern ourselves over the means of transport until we need to, and at that point the 'bus arrives at our doorstep, otherwise we go out and a few minutes later we see it appearing at the bottom of the street.». As you can see, the transition from carriages to the omnibus is a transition from the private ownership of the means of locomotion to a solution designed for the specifically urban situation; our first and main argument is that a similar transition is the one we are having to cope with at the end of this century. After the omnibus came the railway - 15th September 1830 : Liverpool - Manchester.

In the cities law and order is the uppermost priority, immediately followed by the problem of mobility and its environmental compatibility. Mobility, or should we say the absence of mobility

owing to congested city traffic, is undermining one of the historical advantages of the cities: the extreme ease with which different peoples and cultures come into contact with one another, what economists term a «reduction of transaction costs». In short, cities are running the risk of undergoing an historical regression from being the inimitable sites for social intercourse to becoming socially incoherent «encampments»; geographical articulations, junctions on the «trade routes» dominated by «castles»; in other words, a «neo-aristocratic» model. In the interpretation we are proposing then, what is relevant is not the technical means for assuring mobility, but mobility as a social asset and an individual right to be safeguarded.

As we have seen, at a certain point at the beginning of the 19th century the way of looking at mobility changed radically - there occurred both a democratisation and an urbanisation of the problem - and so did the technical mode for its realisation; the previous level of *embedness* was destructured and a new culture came to the fore, able to come to terms both with a different articulation of society and individual rights, and with the changing role of the cities that became industrial locations and are thus dense and large enough for collective, reticulated solutions. This shift in perspectives has some preconditions as well as social and economic consequences, but this isn't the place to analyse them thoroughly. We just want to mention some themes: the extra-mural space as a public space to be infrastructured; the great cities seen as a space to be covered regularly by means of the construction of inter-nodal transport networks, with the consequent enhancement of the radial connections between the city centre and the outskirts, rather than those links that are merely used for transit; therefore, there is a need for planning and for an increase in public actions as the only way to supply an answer to the problem of mobility (by the way, this is also true for guaranteeing personal safety).

In this light, how do we get, at the beginning of this century, to the victory of the automobile? The progressive decay of the urban condition due to industrial pollution explodes between 1845 – when Engels was describing Manchester and London – and 1900 – a case in point is the growth of Chicago where there were repeated outbreaks of cholera throughout the second half of the 19th century. In the meantime, the great industrial cities were creating ever-growing public transport networks - horse-driven omnibuses, trolley cars, underground railways. According to the data reported by an Italian researcher[1], in the mid-1880s in 300 American cities there were 525 horse-driven tram companies transporting 188 million passengers a year, thus leading to an exodus from the old city, enabling the development of the suburbs and the growth in the number of commuters. This phenomenon was catalysed by the spreading of the trolley car which reduced costs and increased speed: in the USA «...in 1890 the street railways, as they were then called, transported 2 billion passengers a year, twice as many as the rest of the world. In the American cities with over 100,000 inhabitants, each person– including children– made 172 trips a year. By comparison, Berlin, which disposed of the best tram system in Europe, would have been ranked just 22nd in the United States»[2]. The growth of the cities that ensued, along with the growth in commuter numbers, is spectacular: in 1910 public transport carried a million commuters into the Chicago Loop. How then do we get to the victory of the motor car?

The weak point in the reticulate solution is its low flexibility due to the relative size of the fixed investments: you can't take a trolley car everywhere and so the radial relationships between the centre and the outskirts are privileged, and not between different points on the outskirts; the number of journeys cannot be more than a definite number and only in some cases can they be spread out around the clock. In a 1933 report the United States President Herbert Hoover was told: «the rapid popular consensus for the new vehicle is mainly due to the fact that it has given its owner the control over his own movements that he had been denied by the previous means (- as we have seen this was only possible in the previous aristocratic and upper middle-class model of the carriage -) Within easy reach and ready for instant use, it takes its owner from his doorstep to his destination according to itineraries that he himself has chosen and within a time schedule and an itinerary that he himself has decided.»[3]. As a

[1] Marco d'Eramo – The pig and the skyscraper: Chicago a story of our future – Feltrinelli, Milan, 1995
[2] ibid., p.89
[3] ibid., p.96

speaker has observed in one of the speeches at our Rome Congress:

"From carts to carriages, from animals to human beings, a complex social interaction was expressed on the street that very often had little to do with mobility. In fact, there was a street-market, children playing in the street, in other words, highly varied social intercourse and symbolic interactions would take place. To destroy that social interaction and to abstract a single value (that of mobility) was a long and articulated struggle that the motor car fought on several fronts. From the immediate and violent impact with the social community prevailing in the street to the one with the legislative and parliamentary lobbies, the motor car constituted its own new *weltanschauung* with one aim clearly in mind: the unopposed domination of the street and the ridding of all its rivals.(..) So while the struggle on the production front witnessed a long phase of comparative calm after the success of the Fordist command model, that of consumerism was more laboured, at least up until the creation of the road especially built for the motor car: the motorway. The abstract form of «assembly time», a pure and abstract form of the command for the motor car, we rediscover it in consumerism when the struggle over the use of the street is resolved with the autonomous production of a road space exclusively designated to the motor car. This idealisation of the street was the definitive victory of the motor car: both the manufacturing system and the territory's consumption pattern indeed depended exclusively on the motor car and on the delivery of its functions "[1]

This amounts to a redoubtable winning card: in the 70 years from 1920 to 1990, we have moved from one car every 13 inhabitants in the USA and one every 1,026 in Italy, to one every 1.8 in the States and one every 2.3 in Italy, as against one every 1,220 in China. The impact on the city is huge. Mobility has become utilisable even for the inhabitants of areas having a low population density that do not dispose of a public service, areas situated significantly far from the large and middle-sized urban centres, this has in turn modified the morphology of the cities and the metropolitan areas: the streets lose their characteristics as places for socialisation up to the extreme case of the urban motorways, etc.. And yet the motor car remains the paradigm *par excellence* of freedom of movement; but for how much longer? Before moving on to the present-day, it might be useful to summarise what is supplied to us on the conceptual plane by this really brief historical digression.

In the first place, the levels of technological and economic *embedness* have never until today prevented the radical re-orientation of technological and economic investments when the level of social and cultural *embedness* that sustained the previous model has been de-structured; this has not always happened in the same way and at the same pace - the omnibus has disappeared but the tramway is enjoying a second lease of life and the underground railway has never been toppled from its position as a key solution in the metropolis, in each phase what has changed is the reciprocal relationship between the different technological strands. The fundamental vector of change we think we can isolate - the utility value of the different goods for mobility - is the problem of mobility as a collective as well as personal right. At a certain point an insoluble conflict has arisen between the specific modality for realising the mobility in a given period and its actual utilisation either collectively or individually. In short, there has been a split between what Marx called the utility value and the good's exchange value. At this point the conditions are determined that allow for a transformation and, when it takes place, the drive is so powerful that the process doesn't stop, even before the destruction of the non-amortised fixed capital - a case in point is the destruction of the tramways or the urban sprawl created to make way for the motor car - or before the vested interests however powerful they may be. The process of change has hitherto come about blindly, that is, without any prior awareness of the medium or long-run consequences of a given choice; which is another way of saying how much the drive towards mobility is a «primary drive» that needs to be «elaborated».

The car's degree of social, economic and cultural *embedness* is particularly strong. The motor car industry still represents best instance of industrial rationality, the industry with the highest manufacturing employment rate both for the developed and for the developing countries; in short, it is a strategic industry. The amount of

[1] O. Marchisio - Mobility as social product - Rome , April 1997

direct and indirect investment by the State, households and private capital in the motor car industry is enormous. The cultural model of the car as a way to conquer personal independence is still very strong; paradoxically what is increasingly crisis-ridden is the motor car understood as the prime and most rational means for assuring mobility both inside and towards the cities. The text that I am about to quote portrays the problem quite well:

« It is stuck in a queue between an Alfa Romeo 164 and a Renault Clio, our fault-free Toyota. Stuck and stationary like the others, it occupies 10.7 m2/person, like any other car, at the traffic light or at the junction, as it waits to move or freeze forever. This time, after a long wait, the metallic serpent starts moving and reaching 30 km per hour, our Micra now occupies as much as 75.3 m2 per person and after slightly pressing the accelerator at 50 km we reach something like 169.0 m2 per person. At the same speed a bus utilises 40% of the availability, occupying 8.8 m2 per person and an urban train around 3.2 m2 per person. This is why the car's utility value is being worn out, highlighting the crisis of the socio-productive system that produces it. (..) Naturally,through the automobile there isn't the acknowledgement of the network that enables its utilisation, while this emerges only when the network itself blocks the car.

Only with the queue at the cross-roads or with the traffic jam on the by-pass does the network dimension of the automobile system emerge, while in the routine phase, there appear no constraints nor network opportunities within which the car is situated and, by means of which, it functions as a private vehicle.

As this network relationship emerges, a possible strategy is also outlined for re-designing the vehicle or the vehicles, starting from the space-mobility ratio, rather than starting from the car as a space around an engine.»[1]

To sum up: there is a "network dimension" of each system of mobility, namely of the automobile system, that must be disembedded from the specific means of locomotion, namely the car. Historically we know two different patterns: a) highly flexible, such as carriages and cars, and based on private ownership of individually oriented means of locomotion , or b) lowly flexible or reticulate solutions, such as omnibus, trolley car, bus, underground railway, based on planning and an increase in public actions, not necessarily on public ownership.

We can illustrate it with a simple scheme (see figures 1 and 2): what we need to day is a shift to the public / non reticulate quadrant, combining public solutions with a non reticulate network dimension.

THE URBAN SUSTAINABILITY AND THE CAR-SYSTEM

The concept of networks, expressed in the previous paragraphs, is intertwined with the environmental perspective of the urban mobility crisis from an epistemological and planning point of view. In fact, on one hand it allows us to understand the system of complex interactions that exists between the environment, the economy and the urban society, and on the other hand it presents itself as a "project idea" at the basis of a correct sustainable territorial planning strategy.

From the point of view of the cognitive contextualisation, the network perspective in which the car is placed is eloquently expressed by the following example:

Every time a city dweller decides to travel by car rather than by bus, the transport enterprise suffers a slight decrease in income and the buses endure a slight deceleration because of the further increase in auto congestion. Both these effects contribute to making the bus service less attractive for the other passengers, who are, in turn forced to choose the automobile.

The more the use of the automobile becomes widespread, the more important it becomes for employers, shops and other services to become accessible to motorists rather than to public transport users. Therefore services tend to move to sites accessible to cars but badly connected by public transport, thereby forcing other consumers to use the automobile.

When the passengers of the night-time buses decrease, women start to feel vulnerable and so look for alternative means, as a result the number of people that travel by bus at night further decreases and therefore the sense of insecurity,

[1] From the announcement for the Conference : «Mobility Product: Alternative Scenarios For Mobility And The Motor Car In Metropolitan Contexts» held in Rome in April 1997.

whether it is true or presumed, increases for the remaining passengers.

Likewise, the increase in the number of parents that accompany their children to school by car causes the other parents to worry more about the dangers of the traffic and so they too accompany their children to school by car, thereby increasing the traffic and the sense of the danger.[1]

As these issues illustrate, the problem of urban mobility should be interpreted by an integrated environmental, economic and social analysis. The impact of C02, S0x, Nox and particle emissions from cars in cities and for the global environment is well-known. The automobile city also forces us to consider the economic evaluations of the total cost of transport. According to a recent estimate, in the case of the United States, they amount 1.2 to 1.6 trillion dollars, equal to a fourth of the American GNP, this figure is greater than annual expenses on health and education.[2] The purchase of an car involves considerable fixed costs that includes the capital and depreciation of the car itself, taxes, insurance and garage expenses. The comparison between the cost of a single journey by car and by bus, that is a lot more expensive, forces the citizen to maximise the use of private transport, indeed the use of both means of transport is a luxury that only the more well-to-do classes can afford.

From the point of view of an integrated economic and sociological analysis it would be interesting to thoroughly study the social effects of mobility systems. The car system, in fact, constitutes a variable of great significance in social action as it distributes costs and risks in a diversified way according to social stratification, and it can also generate occupational structures.[3]

The social and environmental perspectives of problems linked to urban mobility can be ascertained in the light of an analysis.

It is useful to implement the concept of *urban ecosystem*, as proposed by Brugmann and Tjallingii[4], to demonstrate how the interactions between the urban environment, society and quality of life form a complex system and to plan, in the light of such interactions, sustainable urban mobility models.

However this approach assumes that every city works exactly like a natural system with inward and outward flows of materials and energy. In fact, similar to what happens in nature, all economic and social phenomena and all activities for the production and "consumption" of "goods" and services are based on a metabolic process of material and energy. Such flows involve every human activity and go through houses, cultivated fields, factories and cities to return once again to the natural environment in the form of gas, liquid or solid material, waste and rubbish.

However, contrary to what happens in natural cycles, where every substance used by living creatures returns to be made available for other creatures, human processes and activities consists in withdrawing from the limited resources of the biosphere, thereby generating an irreversible impoverishment. This then produces waste and rubbish that returns to the natural environment and modifies it negatively.

This analogy is interesting because it consists in the possibility of applying the technique of empirical ecology to measure the impact of cities on other physical ecosystems such as the surrounding countryside. This analysis appears to be indispensable to define the most suitable measures to allow the distribution of resources to be as circular as possible, so that urban development can be adjusted to their availability and limitations.

Widening the concept of the urban ecosystem to include the social and economic perspective, the city can be defined as *social ecosystem* whose *carrying capacity*[5] covers present and future needs and social pressures. In this sense, we can integrate the spatial dimension of the city (the Latin *urbs*) with that of the social and the values dimension

[1] ECC, Group Of Experts On The Urban Environment (1994), The sustainable city in Europe, First Report, Doc. n° I/95/502-EN, pg. 43 [2] BATT, W.H. (1998), "Motor Vehicle Transportation and Proper Pricing: User Fees, Environmental Fees, Nad Value Capture", in: *the Ecological Economics bullettin*, vol.3, No.1, 1998, pg. 10-14.

[3] Wickham, J., Tovey, H., (1997) "Only losers take the bus: winners and losers in the car system", in: IRES, Atti della Conferenza Euroopea "la Mobilità come prodotto: scenari alternativi per la mobilità e l'automobile nei contesti urbani", Working Paper n.4, pagg. 113-134

[4] Latouche, S., (1995), *La Megamacchina: ragione tecnoscientifica, ragione economica e mito del progresso,* Torino, Bollati Boringhieri pag. 114

5such a concept, borrowed from Rees, means that the biological species of a given ecosystem can be indefinitaly sustained as long as the complex mechanismus thatsuch a concept, borrowed from Rees, means that the biological species of a given ecosystem can be indefinitaly sustained as long as the complex mechanismus that that control it are not disturbed

(the *civitas*) of social cohesion, interpersonal exchange, wealth and plurality of experiences that have constituted, in the course of history, the reasons and variables of development or of urban decline.

The use of ecological language can also allow significant variations in applicable prospects, even in the analysis of city-related social sciences. "Niche" concepts applied to models of urban transport, related to various types of people, ways of life and activities can, for example, better highlight how mobility varies according to urban social stratification, sex, age, and the distribution of income to calculate how costs, opportunities and the risks of the *car system* are distributed.

On the other hand, the term "symbiosis" can present with great incisiveness the forms of social dependency that result in the use of the car, just as recourse to that of "diversity" can enrich the viewpoints in support of the "multi-modality" of transport.

Natural systems have, in fact, a lot of similarities with social ones. As happens in nature, where the hypertrophic growth of an organism brings about its destruction, in the social field, the exceeding of some critical thresholds means that every arithmetic increase in the dimensions of an institution corresponds to a geometric increase in management problems. Therefore social systems and cities, as with natural systems, must have appropriate dimensions. Even urban planning and transport systems must take account of this "theory of dimensions" to reconcile the demands of growth, "size", spatial dimension, with those related to the "human dimension."

The crisis in our cities is paradigmatic of the crisis in the model of unrestricted growth founded on the thaumaturgical power of the market and technology, the underlining assumption of the conceptual apparatus of neo-classic economy. According to such a model, the market, can intervene sooner or later, through technology, to prevent the crisis caused by the complete depletion of natural resources, as the increase in prices, due to the shortage of resources, can provoke extraordinary possibilities for the substitution of these resources with other manmade products. Even though this thesis has been much criticised, there is still such faith in progress and technology that it justifies the belief in the possibility of artificially creating, in a unlimited way, industrial substitutes for natural resources. In this sense the affirmation of the Nobel prize winner Robert Solow is enlightening as he sustains that: " It is very easy to replace natural resources with other factors and so, in theory there isn't a problem. In fact, the world can continue without natural resources. Therefore their exhaustion is at most, a misadventure, not a catastrophe.[6]

Even though the thaumaturgical power of technology still has to be fully demonstrated, in the theoretical apparatus, empirical evidence related to the unintentional consequences of technological development should be assumed upstream of our growth model. From this point of view, the crisis in urban mobility is an example of how the application of a technology generated with a precise objective, to make movement more rapid and autonomous, can lead to completely opposite consequences to those desired.

Today the average speed of a car in an urban centre is less than that of a "lesser" technology, such as a bicycle or horse. In the case of urban transport, the price of the "disconnection" between the objective of technology and the effects of its actual application is high from the economic, social and environmental point of view.

The impacts on the Italian territory of the *car system* in terms of atmospheric and acoustic pollution, occupation of ground and congestion can be demonstrated by a series of significant data. In urban areas, environmental costs generated by traffic are more evident. The 1996 ICLEI report, *Ozono* confirmed that the main source of pollutants (nitrogen oxides and volatile organic compounds) is represented by motorised traffic: the concentration and spatial distribution of the sources play a fundamental role in the determination of pollution phenomena, Benzene, PM10, etc. By analysing data on Italian cities that survey NO2 levels (from a recent inquiry on 103 administrative centres), it emerges that 40% of these centres have exceeded the guide value of 130 ug/mc by 40%, whereas 8 cities present values above the 200ug/mc standard.

In fact, none of the 10 major administrative centres register concentrations of nitrogen dioxin that are in line with quality objectives.[7] However,

[6] cit. in: Latouche, S., (1995), op. cit., pag. 114

[7] Legambiente, Istituto Di Ricerche Ambiente Italia (1997) Ecosistema urbano: Rapporto sullo stato dell'ambiente dei 103 capoluoghi di provincia italiani, IV edizione

as far as total particle levels are concerned, a study by the Rome Division of the World Health Organisation reveals that most Italian cities do not exceed annual guide values (60 ug/mc) but the standard daily value (125 ug/mc) is exceeded in at least 5% of days a year, especially in administrative centres. It is no wonder that the same study according to available estimates and for urban residents, calculated a rise in the risk of contracting lung cancer from 9% to 33%, independent of the habit of smoking.[8]

The 30 million motorcars and around 3 million industrial vehicles and buses in circulation in our country occupy about 370km2 that represents 0,12% of the whole national surface area. The maximum concentration is in the cities, where the percentage of occupation reaches almost 5% of the whole urban area, as is the case in Turin, Naples and Milan. As far as the problem of congestion is concerned, not having estimates related specifically to Italy, then the case of the United Kingdom is indicative where 83% of national congestion costs regard urban areas. Although the context is different, the tendencies appear to be similar: even in Italy, as a result of the progressive transfer of residents from the centre to district councils in the first and second outer belts of the city, there is an increase in the demand for new parking spaces in relation to the increase in motorised mobility in and around the city. This then causes the further decrease in parking space normally destined for residents.[9]

The paradigm of unrestricted growth, of direct neo-classic origin, led to the implementation of the functionalistic model of urban planning, *zoning*, placing the city at the service of production. This model concluded the process initiated by the industrial revolution. In fact in the pre-industrial era, there was an organic and harmonious link between the city and the surrounding environment. The former provided the city with food supplies and energy by using methods that allowed the reproduction of resources, contributing positively to the interactions between biotic and abiotic worlds.

Subsequently, with the capitalistic need to concentrate machines in a given physical place and with the creation of the "factory-city", according to the spatial-temporal laws of the Taylorist -Fordist production system, the relationship between city (functional place) and the environment where it is located (place-territory) was completely destroyed. The development of transport facilitates the withdrawal of resources beyond the city's natural supporting territory, giving the illusion that these are limitless as they can be extracted anywhere.[10]Therefore the territory, as maintained by Magnaghi, " is broken down into parts and transformed into an inanimate object: every mono-functional part that is attached to a place reduces it to a mere site. This site no longer has internal relations with its environment but is aware of being a functional part of the economic and productive system; each of these sites/functions looses its capacity to self-generate and self-reproduce. Functions are given to each place (the residential area, industrial area, commercial centre, motorway, etc.) and networks of relations are created among the functions, each of which covers a place but is incapable of reconstructoring a place given that it is a funcion (or network) of somewhere abstract."[11]

In fact the development of the mono-functional model is responsible for the subdivision of the urban area into anonymous areas without any history: the place where people live (or better sleep), where they work, where the green area is separate from the place of culture. The development of zoning that characterises most Western cities has had a great impact on the transport system, encouraging the intensive use of the car.

Therefore, problems related to urban mobility stem from erroneous choices made in the field of urban planning, economics and the use valorisation of resources that can all be traced back to adhesion to the "limitless growth" paradigm. Given the classical "retroaction" of the system, these problems become central issues of urban decision-making policies, as they can constitute the unresolved premises responsible for the progressive collapse of the city system.

[8] This study is quoted in the: Istituto di Ricerche Ambiente Italia (1998), *La mobilità in Italia. Le tendenze, gli scenari, le politiche*

[9] *ibid.*, pag. 66

[10] cfr. Scandurra, E. (1995) *L'ambiente dell'uomo: verso il progetto della cittàsostenibile*, Milano, ETAS, Alberti, M. *et alii* (1994), *La città sostenibile. Analisi, scenari e proposte perr un'ecologia urbana in Europa*, Milano, Franco Angeli .

[11] Magnaghi, A. (1992), "Per una nuova carta urbanistica", in: AA.VV. (a cura di A. Magnaghi), *Il territorio dell'abitare. Lo sviluppo locale come alternativa strategica*, Milano, Franco Angeli, pag. 25

The traffic issue cannot be confronted on its own as it is an element of the system. Only a combined solution to remove the causes, especially the urban and economic ones, can bring some benefit to the problem of mobility in modern cities. However, we believe that it is even more useful to make a logical step and assume, through research and experimentation, a new perspective, that of the "sustainable city" where the concept of network plays a key role.

The city is a place to meet and socialise, capable of supplying meaningful components to overall identity, kinds of behaviour and traditions, broadly speaking culture. Moreover, cities are the main places of production, consumption and creativity with a decisive role in both the economy and the global environment. In this context, mobility assumes a decisive role in terms of the circulation of ideas, people and products. In this sense, the "sustainable city" contrary to the "city of unlimited growth" is founded on "relations" rather than on expansion and construction. The network, as a project idea, is above all the instrument that can allow the renewal and extension of links within the physical environment and the environment constructed in the "city eco-system". This concept can be interpreted in two ways. First of all it means taking advantage of a constructed environment, in other words "to be able to participate in life cycles within a "place"[12] and therefore re-establish the relationships: nature-culture and city- surrounding territory. To enable the link with places to be re-established, it is necessary to recognise their history, environmental equilibrium, and cultural, economic and esthetical values in prospect of a qualitative and not quantitative growth based on the valorisation of such unique aspects. In this sense, it is necessary to devise a mobility model that allows relations with places to be developed and not mere "passages" towards "somewhere abstract.

The second meaning is that of networks as an instrument make the closure of cycles of material, energy and waste flows feasible through the adequate planning of the urban territory. An example of this has been carried out in Holland where a methodology, based on the principles of eco-systems, has been devised and implemented. This method, known as the "dual network strategy" allocates a fundamental role to transport networks and to navigable routes in the city's configuration, elaborated by the Institute of Spatial Organisation of the Institute of applied scientific research (INTRO-TNO). This ecological planning methodology considers the transport network as having an "orientating effect for extremely dynamic use, such as enterprises, offices, mass recreational activities and agriculture", whereas the navigable routes condition "less dynamic use such as water collection, nature and less intensive recreational activities" [13]. Combining the two networks brings about the creation of a framework to orient, in a sustainable sense, urban developments and to pinpoint the location of various urban uses.

The planning of the "sustainable city" also requires the application of the concept of network at a further level: the decision-making level. An integrated process of urban management, capable of gathering the complex interactions between the social, economic and environmental dynamics of the "urban eco-system", means combining the courage, competencies, experiences and needs of all the economic and social actors as well as the citizens themselves in a participatory *bottom-up* process. These actors must be able to pinpoint and develop forms of collaborations and partnerships, integrate policies, measures, controls, market mechanisms and correctly manage information within a democratically chosen political process that can justify the objectives of sustainability as well as the means to achieve them.

THE CRISIS OF OVER-PRODUCTION

The crisis that this brief text outlines is extremely clear and is taking on the characteristics of a crisis of over-production due to the clash between utility value and exchange value. If we take the Italian situation as an example, before the tax incentives: the number of vehicles produced in 1993 is very close to that of thirty years before, with the major difference that in those days the vehicles circulating were 6 million while today they number 32 million: the parity of the

[12] Pizziolo, G. (1996), *Dimensione urbana ieri; oggi; domani. Mobilità urbana ed extraurbana, mimeo*

[13] van der Wal (1993), cit. in CCE Gruppo di esperti sull'ambiente urbano (1994), op. cit. pag. 112

production data is matched by a total disparity in perspectives. Even the most dogged defenders of the car must admit that the only possible market is by now a market of substitution. The essential elements of the automobile form itself are being betrayed by the sector's quantitative development. The car's spatial dimension actually devours the city and concomitantly erases the car's essential functions, that is, speed and autonomy. The occupancy of the urban space causes a reduction in speed (we even arrive at its negation) and significantly limits the autonomy of travelling: the car is no longer synonymous of freedom.

More in general we can say that the mid-run trends, for example from the standpoint of the car registrations in Europe, are all the same. In 1991, 13.5 million cars were registered; that was the peak value, in 1993: 11.26 m, in 1996: 12.82 m. Obviously it is hard to make an assessment of 1997 data, as a result of the doping of the market following the government incentives in Italy and alike measures in other countries . In any case, we are witnessing a variation of between one and one and a half million vehicles, which corresponds - coincidentally - to the productive capacity for example of one of the European producers. Some people say that although this is all true, the «green prairies» of Asia and South America await us. In April 1997 the forecast for Asia was published, carried our by DRI, the biggest agency for research into market trends of the international automobile sector. In the DRI report on the Asian market the forecast is that by the year 2000, the Asian market will come up against a serious problem of productive overcapacity. The capacity installed in the Asian market was 1.6 million in 1995, rising to 3 million in the year 2000, thanks to heavy investments by GM, Ford, Madza, Honda, Mitsubishi and Nissan. This will lead to a decrease in the amount of plant and equipment utilisation, and the estimate is that the regional average in Asia in the year 2000 should be around a 57% of plant and equipment utilisation, with a drop of almost 10 per cent on the average; these drops will also be the case for the big producers, falling from an 85% to a 75% level of plant and equipment utilisation. The actual Asian situation is worse than the 1997 forecast because of a general economic recession and a strong increase in social inequality.

The situation regarding South America is in same troubles, as you know, there is a throng of investors, amongst which Fiat is setting up productive capacity. The level and the quantity of the investments and the productive capacity that is distributed in that area lead to pessimistic considerations: the market opportunities are certainly being seized without hesitation, so quickly by everyone that probably sooner or later a problem of overcrowding will occur in that part of the world as well.

We are facing a serious problem: there is the risk, for structural reason, that we will end up with a surplus productive capacity, vis-à-vis the world market. Competition is bilateral: it's not only the Westerners that are investing in the East but it's happening the other way round too. It comes no surprise the fact that the worsening of the situation in Asia lead to an increase of the competition, through direct investments in equipments, in the richest market of the world like Europe. Clearly, the aim is to grab a slice of the medium-high European market. There are also minor skirmishes that regard relations between Europe and the United States.

Competition also occurs in the battle for the market «segments». All the European and American luxury car producers have decided to crowd the middle range. So there is pressure to concentrate on this market segment, the one seen as the richest market segment, the one in which there are the widest profit margins. There is also a squeeze on costs that in part translates into a race towards re-localisation in Eastern Europe of the main European producers. The competitive pressure is very high also considering the market side alone: the relationship between demand and supply. There are reasons inside the business organisation's structure that push towards further competitive pressure. Over the last ten years the car producers have got rid of a large quantity of *organisational slack*, they have in other words become *lean* to such an extent that the working cycle has become hellish.

The reduction in the market placement times of the cars, the reduction in the product-cycle of the car, the need to change the models continuously, has produced such a mix that the pressure on the lowering of the *break even point*, from the point of view of the company's internal costs, pushes towards a re-organisation that has till now affected, in sequence, production, then the logistic chain of suppliers, and lastly the sellers. The aim is always

to try to hold together an infernal cycle that has reached an extreme limit.

The crisis is thus two-fold: a crisis in the product's utility value as well as a major drive towards productive rationalisation, which opens up insoluble social wounds. There arises therefore the need for a transition, for a re-newed rupture from the old technological *embedness,* from the old social system of mobility to a new one. The former Volkswagen chief, Goeudevert, was aware of this, and back in 1991 said: "If we want to save the car from its biggest enemy, congestion, we have to develop a new concept for traffic in general and also to accept that certain solutions require new types of automobile, namely, new propulsion systems. The automobile industry carries the responsibility for both aspects. Volkswagen is committed to doing pioneering work"[1]. As is well-known, Goeudevert was replaced by Piech and the choice was completely different. The European Union Commission with its programme "The car of the future" seems to pick up this message. As was said at our Congress in Rome: "We deliberately speak of systems because the car is perceived as being "private" but it cannot be utilised in isolation, but only within the scope of a metropolitan and social space inside which the physical and information technology networks are structured, such as the traffic light systems, the car-park layouts, the spatial typologies of the roads.[2] As a matter of fact, we cannot think of the motor car as an element isolated and separate from the network morphology. The presence of a complex road infrastructure, signalling and set-up, with high maintenance costs, allows us to carefully consider the modalities of car use in relation to its essential functions, that is, the private use of the car is only possible within a completely «artificial» environment. (..) As the mobility is capable of reducing time value in relation to space, it is evident that the *auto-mobile* has today become a constraint and represents conservation as opposed to autonomy and freedom of movement. The transport times in the cities have again become comparable to those of a century ago, when the slowness was determined by the absence of the technology that was to develop subsequently; that is to say, the car has become physically awkward and is wiping out the function for which it was first invented and built.»[3] So we need a different framework for mobility both in the West and in the East; in the West because the old one reached its social and technical limits, in the East because of the non - sustainability of that model both for social and environmental constraints. It consists both of 1) a re - design of the old product - the car - and of 2) a systematic design of the urban environment as a networked public space.

The first goal can be articulated as a restructuring of the automobile sector as a whole - the final assemblers and the suppliers - in order to re - design :

- the single part of a car - for instance: the engine;
- the bundle of product / service represented by a car; we mean the possibility to sell not a car but its mobility service and the car as a by - product;
- the car as a whole - its spatial dimension, its social usability ,etc.

It means a stronger segmentation of the market and a deep change in the possibility for new producers to come to the market. The second goal, from the point of view of the automobile sector, means that the network will become the basic structure and that the, publicly made, agreements on the nature of the network will become the basic determinant of the process of production, via laws, rules, standards, etc. It implies the necessity of a vertical integration between the classic automobile sector and a newly emerging urban design and management sector.

[1] I owe the quotation to U. Jurgens – "The development of Volkswagen's industrial model, 1967 – 1995" - forthcoming in Michel Freyssenet, Andrew Mair, Koichi Shimizu, Giuseppe Volpato (eds.) - *One Best way? Trajectories and Industrial Models of the World's Automobile Producers*, 1970 - 2000

[2] Car makers in Germany as well as in the USA are introducing mass car leasing.

[3] O.Marchisio – op. cit. -.

Figure 1 : - An historical movement based on the network dimension of each system of mobility; a two ways classification: reticulate vs non - reticulate and public mode of consumption and / or planning vs private mode of consumption and/ or of decision making

Mode of Consumption Network / Type	Public	Private
Reticulate Non-reticulate	Mean of locomotion Mean of locomotion	Mean of locomotion Mean of locomotion

Figure 2. - An Historical Movement :

Mode of Consumption Network / Type	Public mode of consumption	Private
Reticulate	Omnibus, trolley car, bus, underground railway	
Non-reticulate	The new pattern we are looking for : Niches products; a bundle of product and services; new physical patterns for cars; etc.	*Carriage, car*

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