

## ROADS IN A POST-INDUSTRIAL SOCIETY

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### FOREWORD

We live in a transitory period - I have used this expression, so far as I remember, in three different occasions during the nearly 50 years of my career. The first was during the thirties in my thesis (about a possibility of a form of planned economy), the second in the 60's in a paper of mine at an IRF - meeting in a technological and social sense and the third now. That shows a great frequency of changes, during so short a period of the economic and social history, to which should be added, the great change at the first quarter of our century, coinciding, and partially brought about, with the first World War. It is this change in the economic and social life in relation to road transport in its present and future trend that I will try to describe in this paper.

### INTRODUCTION

The necessity to make a characteristic distinction from one epoch to the other, in order to understand the economic and social life is very old. One of the oldest, and the one now prevailing among theorists and systematists, is that according to the "State of production". So early as that, Aristotle discerned the stages of life of nomads, agriculturists, brigands, fishermen and hunters (βίος νομαδικός, γεωργικός, ληστρικός, αλιευτικός, θηρευτικός, Pol. I, 3) and that some of them could historically coincide in different places. In another place (Pol. I, 6) he made the basic distinction between all the above modes of life and that of the merchants and shopkeepers, with their tendency of money earning and the change of the purpose of it, from that of economic covering of the needs, to the possession of wealth, ad infinitum.

According to the state of production, were also the distinctions made at the beginning and further evolution of economic theory, like those of Adam Smith (1776), Gustav Schoencerg (1890), Colin Clark 1940, primary (extractive), secondary (manufacturing) and tertiary (services, among which transport), Paul Hais and Nelson Foote 1953, quaternary (financial services) and quinary (intellectual) sector, towards a professionalization of work, Zbugniew Brezezinsky (1970, utechnotronic society», one that is shaped by the impact of technology and electronics-particularly in the area of computers and communications —) and last but not least Daniel Bell\*, who was not the first who used the expression post-industrial society (as I do also) to describe the present state in the most thorough and profound investigation into this complex, broadning the "State of production" principle of the previous investigators. We sees the post-industrial society as transitory and interstitial and ventures a social forecasting into the next century using the axial principle of an intellectual technology, specifying not causation but centrality.

There are, however, also other kind of principles, which have been used in the systématisation of economic history, especially amongst German theorists. So the quite-single-minded of the "possession of the means of production" of Karl Marx (1867) leading to the determinism from the sub-structure to the super-structure. Or the "length of the way from production to consumption" of Karl Bûcher (1893) and the periods of closed house-economy (no barter), town-economy (direct barter) and national economy (distribution of goods). Or that of Bernhard Harms (1912) of the way from the single-economy (Einzelwirtschaft) to the national economy, which was rendered possible by free trade and the improved transport conditions and the World-economy, which was the result of the free trade treaties amongst the national states and the high development of world transport, from which at that time only the first was an empiric reality, whilst the other two were only visions of the future.

At last I will mention Werner Sombart who was during the first half of the thirties my teacher at the University of Berlin and who according to my opinion was the best historian and systematist of economic life and the one who introduced Diltey's method of 'Verstehen' (understanding the significance, meaning) in social sciences \*\*.

\*The coming in Post-Industrial Society, N.Y. First Ed. 1973 Sec. 1976. (The original formulation started in 1962).

\*\* From the long list of his book, I mention here, except his basic work. «Der mo-

In order to understand economic phenomena he created the system-forming idea of the economic system. To the theoretical aspect of the economic system, corresponds the historical of the economic epoch. Each epoch shows the characteristics of a certain system. During the time where it is clearly prevalent, and so to say characterises a historical period, we speak of the high epoch of this economic system. The time from the appearance of a new system up to its full development, is its early epoch. This early period is the last epoch of the outgoing system. The early and the late epochs are periods of mixed style of transition times. Werner Sombart has used this scheme to describe the evolution of the capitalistic economic system (or otherwise industrial economy) from early, to high and late capitalism (starting from the 20'ies). What Werner Sombart saw as next, was a short, of centrally or not, planned economy or a formal socialism or normativism (an differing from the liberalism of the capitalistic era) or the realisation of various forms of socialisms (which in some cases took the form of a state capitalism) in various countries, and this of course with remnants of the previous systems, so that, what it appears, is always a compound system.

According to my opinion the era of the post-industrial society is following that at the various "socialisms" or simple normativisms (1960'ies) and as we will see later is taking the form of a technocracy. All form the changes which appear as transitory epochs, about which I spoke at the beginning, and which took a much shorter time than capitalism to come into the picture.

Each economic system has three components, the particularity of which characterize each one. These are: 1) the prevailing spirit or mentality, 2) the ruling order or constitution and organisation, and 3) the applied technology or technique. Each system should include compatible particular components, otherwise it is an utopia. There is no determinism in the realisation of the economic systems in history because under given natural and historical circumstances there exists a free decision-making.

How can we then speak about the future?

This is possible to a certain extent by finding out, in each case, what are 1) the possibilities in the choice of targets, 2) the physical and logical necessities connected with the realisation of the chosen targets, and 3) the

derne kapitalismus», «Die drei Nationalökonomien» 1930, «Die Ordnung des Wirtschaftslebens» 1927 and «Die Zukunft des Kapitalismus» 1932.

probabilities which exists, so much for the choice of targets, as well as the means for their realisation.

These "conceivabilities" have found, in the last years, also a mathematical and statistical expression, and there has always existed the intuitive method. Let us now see at:

## I. THE COMPONENTS OF THE POST-INDUSTRIAL SYSTEM

### a. The prevailing spirit

Is: 1) according to the aims, similar to that of the capitalistic (industrial) system, that is to say to make profit or to increase the income, 2) according to the choice of means it is increasingly rationalistic to bureaucratic and 3) according to the disposition to other people, solidaric in the pre-industrial, to egoistic in the industrial, and solidaric to the same profession at least, in the port-industrial system.

The prevailing economic spirit coincides more or less, usually to the "spirit of the time" in general, which we think as emerging from the freedom of will. The characteristic of the present times and the next future seems to be the theoretic minds which strives for the enhancement of self. The technocrats gain a central position in all sectors. Some describe them as the new bourgeoisie (Technocracy).

### b. The ruling form or Constitution

1) The economic life from bound, in the pre-industrial systems, became free in the industrial, to change to free within limits, imposed by the planning needs (normativ), in the port-industrial system, 2) of private initiative in the industrial system, both as regards production and consumption (and mixed as regards transport) to mixed throughout in the post - industrial system, as well as differentiated in many professions with increasing members influence and share in the G.N.P. At the beginning increased the percentage of transport sendees and utilities, then that of the financial services and now that of the information services, 3) the form of the work organisation as individual or social, was throughout, since the time after the pre-industrial society, mixed, especially in transport, and would remain so. The characteristic in the form of society is the increase of the service sector over the agricultural and industrial ones.

### **c. The applied technology (technique)**

Technology was in all pre-industrial systems empiric, whilst with the great inventions of the 19th century and then the 20th, it became more and more scientific. The first inventors were not scientists but with the development of the industrial system the invention became a matter for the scientists, originally of the single scientist and then, more and more for the teams of scientists.

The prevalence of the kind of sciences seems also to have evolved. The first third of the 20th century was under the influence of chemistry, the second third, of the internal combustion engine (and the immense development of motor transport), and the last third of electronics in the sector of transport, as well. The technology of the post-industrial system becomes highly advanced and it is, that what Daniel Bell\* has called intellectual technology. Anyhow the important increase in productivity noticed in the 20th century, is due to a major extent to technology and to a minor, to organisation etc.

## **2. THE ROLE OF TRANSPORT IN POST-INDUSTRIAL SOCIETY**

### **a. The significance of transport in any society**

The role of transport is basic for every society, since it is connected to any activity outside the habitation, becoming thus an essential ingredient of almost everything. The way, and then the road serves to move from one place to another, thus becoming the first infrastructure. The transport means or the vehicle shows, in its developments, the degree of the technical improvement, which together and in parallel with that of the infrastructure show the quality of the transport supply. Both together presented always the unique facility of door communication. The effective desire to use transport, is a complex psychological, economical and social factor, which has as a result the degree of mobility in each society. We can define mobility, in a general way, as the capacity to overcome space. The concept of mobility, is a derived variable and being interrelated with personal factors of time and space availability needs more complex indicators than the one used now, what may help to the planning of mobility\*\*.

\*Op. cit. p. 17.

\*\*For further elucidation see in the Proceedings of the 8th International Symposium of the ECMT in Istanbul 1979, the papers of H. SCHUSTER and W. BROG (Topic 3 A).

## **b. The road**

Road users, and this is by far the greatest majority of the population in each country tend to attach to the road or the infrastructure, a high value, before any concrete demand for transport and communication, and this because they consider the road as an indispensable precondition of transport and communication. The construction of a road is in the mind of the public within limits of course, not a question of a cost and benefit consideration but of communication connections (*liaisons*), which should be granted as a service from the part of the State. Road construction and maintenance is a matter of state policy, and in a market economy the expenditure following cost benefits studies, is governed by the economic policy followed as a whole.

As regards the influence upon roads of the applied technology of the post-industrial era, this has many directions: 1) the degree of theoretical approach in the design and the choice of materials. During the whole industrial era, there was more of an empirical design, both as regards the pavement and substructures, and so was the nature of tests followed. During the last two decades, started a more theoretical design both as regards the materials and the structure which will probably lead to an amelioration of the cost/performance factor. The traditional materials, petroleum/bitumen and cement, especially the first, continue to be predominant and perhaps only minor changes (as e.g. recovered bitumen and sulphur admixture) are probable. The more rational approach in road construction, apart from a better structure design, lead to the adoption of the standards for the great arteries. This had as a result the spectacular improvement of speed, comfort and safety of road transport and the increase of longdistance travel. 2) The impact of automatisisation and electronic technology is manifold upon the roads, e.g. in traffic control and the surveillance of motorways. The surveillance may lead in the future to complete guidance, by the use of electronic technology, of the vehicle on the road improving more, thus, road safety.

## **e. The vehicle**

The concepts of the road, the vehicle and the driver are intimately interrelated. The personal relation to the motorvehicle during the industrial era is very close, contrary to the man/machine relation in the other sectors. In post-industrial society individuals tend to communicate to other individuals, rather than interact with a machine but as regards the system road/man/motorvehicle, the same relation seems to continue, rather intensified

especially as regards the travelled area, a sign of a stronger motive of communication.

The transport-policy followed by the various states apart from the national differences, has a common characteristic the high special taxation of the road user. Fiscal policy took advantage, in this way, of the high price inelasticity of demand for transport from the part of the road user. It is true, that the majority of the states were spending during the industrial era high sums for roads and road traffic control (in some cases even more than the revenue from road users taxation), supporting in this way mobility and at the same time the restitution of revenue. This cannot be said for the post-industrial period, because, even before 1974 and the petroleum crisis, it started generally a decrease of the factor road expenditure/road users taxation, in some cases to so low levels that, even, in not yet saturated markets, there was a sharp decrease of motor vehicles' yearly first registration, as well as of the average annual distance travelled. The reason for this tendency is that the budgets cover now more state and social needs and become more and more a means of economic policy.

Technology will also play an important role in the evolution of the motor-vehicle. We have seen that the motorcar industry was typical of the late-capitalistic period and that now this role has rather been undertaken by the electronics and informative industry. The latter, as is already to be experienced, will necessarily exert an influence on the automotive industry, towards an automatisisation of the motorvehicle and its adaptation to the road, which as we have seen will bear the same influence, with the effect of greater confort, safety and speed.

## CONCLUSION

The form and the extent of this paper does not allow anything more than a sketch of the outlook of transport in post-industrial society, after having traced the implication which are behind. The mentality or the style of life of road users is even more keen for mobility because of more motive and more leisure time. The transport policy is directed towards a diminution of the road expenditure/road users taxation ratio but the increasing international connection and the resulting enlarged flows of persons and goods permit the anticipation of a betterment.

The advanced technology and especially the electronic and informatic technology will affect the design of both the road and the motor vehicle,

as well as their adaptation for the attainment of more efficiency and safety.

The post-industrial society is one of more information and more automation-and we have seen of more mobility but will this bring also more communication from man to man?

During the industrial era this was not the cause. Urbanism and congestion transformed also communication to a superficial rational and practical contact. Planned mobility, more leisure time, and more contact with the nature will probably reverse this situation.