

## MEXICO: ROADS AND DEVELOPMENT

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### ABSTRACT

Mexico started the 20th Century with a Revolution; from 1910 to 1921 the Mexican Revolution was moved by the Railways, which was the main transport system at that time, along with the hundreds of kilometers of roads and trails. In 1925 the National Roads Commission was created as the starting point for the transport infrastructure construction needed by the country for its future development. The road network grew from 1.416 Km in 1930 to 62.235 Km in 1968, and by 1980 reached 213.000 Km. Nowadays, with more than 300.000 km the Mexican transport network is the circulatory system of a complex economy where transport is the fourth activity of economic importance according to the aggregate gross value, accounting for the movement of 80% of all national freight.

### 1. THE BEGINNING OF THE 20<sup>TH</sup> CENTURY

The first automobile arrived in Mexico in January 1895 and by 1900 it was planned to pave 80 streets in Mexico City. Motoring became by this time the favourite sport of the Mexican burgees, young people above all, but was confronted by a fundamental obstacle, the lack of roads. To solution this problem, in 1905 the association for the Preservation and Repair of Roads was founded. The total population at this time was 13.6 million habitants.

In January 1907 the government offices in the city had 860 automobiles registered, and it is said that President of Mexico, Don Porfirio Diaz, stopped using horse driven carriages and changed to an automobile driven by internal combustion.

As the months passed motoring was no longer considered as just a sport of the elegant society, but was seen as an important element in public works. With respect to this, an enthusiast wrote the following prophetic words:

*“The automobile will make the Roads of Mexico, and thanks to it we will have bridges, main and secondary roads, asphalt paved and tree lined. The automobile will shorten distances between villages and cities, erasing borders, and finally uniting nations.”*

For these reasons and at the petition of rich sportsmen, the government created the Joint Commission for Roads to attend the principal roads leaving Mexico City, and functioned until 1911 when it was replaced by the Inspector of Roads and Bridges, a dependency of Communications and Public Works.

During the presidency of Porfirio Diaz (1887-1911) the dominance of the railways made the resources assigned to road construction lose importance, and at times be non existent, in favour of the construction of the “iron roads”. With the appearance of the railways, maintenance and growth of paved and other roads lost importance.

The transport of freight on these roads was still mainly accomplished by mules and carts of little volume, which made the transport of merchandise slow and costly. The transport of passengers was left at the charge of the stagecoach, the litter and the horse. The classification of a road depended on the number of cattle that could be driven along it. A good road was one that could support at train of a 100 mules.

## 2. THE MEXICAN REVOLUTION

At the start of the Mexican Revolution, we find a society organized in economic classes, moving towards a national market. The total population now reached 15.1 million inhabitants.

During the Revolution the principal battles were fought close to important railway centers, due to the fact that the only communications system decided the location of the battles. It was the railway stations, not the city centers that had to be controlled. In a few years, the entire railway system had suffered the consequences of the struggle, derailments, blown up bridges, sabotage in stations, locomotives destroyed, etc. The most violent armed period was between 1910 and 1916.



Figure 1. Images of the Mexican Revolution, the first in the 20<sup>th</sup> Century.

The automobiles in Mexico practically travelled alone on the urban and other roads. The transport of people and merchandise from one city to another had to be made by railway. Even though, their deterioration was leading too near total collapse. Roads had been destroyed and their recovery would be difficult. Its important to mention that the revolutionary movement (a consequence of 35 years of continuous government by General Porfirio Díaz) was a transforming wave which during a whole decade shock the country, firstly violently destroyed, and later creating and reconstructing, if well slowly, institutions, installations and infrastructure, and a new political, economic and social perspective.

In this sense, not only the road network, whose construction had been hardly started in most cities, but also the rail, port, hydraulic and energy infrastructures suffered a regrettable lag in development; it would be necessary to start from scratch.

### **3. BEGINING OF THE MEXICAN ROAD NETWORK**

The Mexican Revolution initiated in 1910, affected the social, political, economic and cultural system in the country, originating a time of crisis which impeded the government in making important achievements of a constructive character. During the first years after the armed conflict, public works could not be planned due to unstable governments and the constant political crisis in which they were involved.

In 1917 a new stage in the life of the country was inaugurated, which lasts until the present day, and which started with the promulgating of a New Constitution which replaced the one promulgated in 1857.

In 1920 a new government program was started, based on the new Constitution and political order of the new regime; little was achieved between 1920 and 1924, and only from 1925 a new era of institutional construction was initiated for roads in Mexico. The president Plutarco Elias-Calles created the National Roads Commission. He expedited a law which established a special tax on the consumption of gasoline to give funds to the commission, which would be charged with the construction, preservation and improvement of roads. The first roads constructed were from Mexico City to Puebla and from Mexico City to Pachuca.

Of course, these funds collected by a tax on gasoline were insufficient, as they are today, and they were always applied to road construction. Even so, a significant impact was achieved in a few years. In 1930 the extent of the network was 1.500 km and the country capital was now communicated with the neighbouring state capitals of Puebla, Pachuca, Toluca and Cuernavaca. In a clear attempt to give to the federal pact a physical expression, the integration of a network was started which would permit, firstly, go from Mexico City to other capitals, and then to maritime ports and borders. This way the port of Veracruz and Acapulco were communicated and later border cities such as Nuevo Laredo, passing by Pachuca, Temazunchale, Ciudad Victoria and Monterrey, This established the first important highway route to the United States, a country which historically had a great influence of the development of Mexico in all forms. Later followed roads to Ciudad Juárez, Nogales and the distant city of Tijuana, at 3.300 km from Mexico City.

During the following years, the commission constructed the planned roads, instructed the first national technicians, and also introduced high performance machinery and equipment, previously unknown in the country. Although new techniques for the location, planning and construction of roads, where now available, planning at this time was still in its early stages. Priority was given to communicating Mexico City with the most important cities, ports and customs in the country. This organism, originally independent, passed in 1931 to make part of the now disappeared ministry of Communications and Public Works as the National Roads Management Direction.

The construction of a road network gave impulse and support to other important revolutionary programs. For example, the construction of hydraulic works to create irrigation districts in the north-east of the country and in many other places it would not have been possible without the parallel or earlier construction of the trunk basic roads. The work of electrification without roads would have been impossible. The growth of the national roads network, had a direct and determining effect on the development of agriculture, and made possible the transport of products, activated potential resources, and opened new lands for cultivation due to the increase in market areas. It became possible to use better and more functional transports and costs were reduced inducing

regional specialization. Crops were changed for others with improved performance. Having bigger markets available, that helped expanding agriculture, as the roads network developed.

On the political front, an territory of nearly two million square kilometers, with 31 federal entities (free and sovereign) united by a federal pact imported from the North American model, could not have been sustained and consolidated without the road network connecting the States together. Also each State generated its own network integration its own areas and cities, strengthening its economic sectors and making possible pursuing its social programs. It must be recalled that in the 19<sup>th</sup> century there were attempts by several States to separate from the Mexican Federation, which felt abandoned by the federal power. The road links were the first step in demonstrating the interest shown by the federal power in forming a real integrated federal country.

By 1930 the country counted with just one city of 1 million habitants and another with 50.000. In these cities lived 16% of the population; in the smaller locations lived 84% of the countries population. At this time very few locations had communication by road, which was the case of Mexico City and another 11 smaller cities.

With the growth of the federal network, from Mexico city, Monterrey and other cities, an urgency was felt to promote road expansion to advance more rapidly, and so, in 1932 construction of roads was initiated in cooperation with the states by means of equal contributions made by state and federal governments, to build roads with the double mission of proportioning social economic expansion as an immediate, imperative need of the nation, and others acting as generators of new economic development in isolated or poorly communicating regions, which represented one of the most complex problems the nation was facing.

In 1940 the national territory was fundamentally rural, and very few regions of the country showed an urban sector of a big scale: The capitol city and 13 populations with more than 50.000 in habitants; in the smaller locations 72% of the population were located.

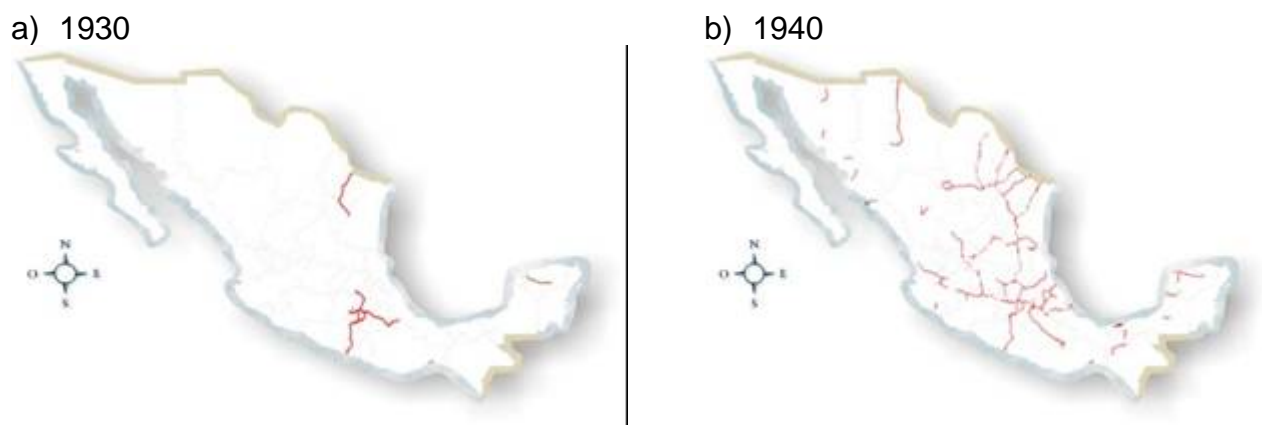


Figure 2. Mexican road network in 1930 and 1940.

Later in 1947, the construction of secondary roads was initiated with funding from third-party arrangement, that is, federal and state government providing resources along with the private sector contributing with similar amounts for the construction of a determined road. Even though the country now had trunk routes and a secondary network, there was a need for a capillary system which would feed the main system and permit commercial interchange, the development of agricultural, industrial mining and cattle production zones

in general, and the social and economic development of the communicated regions. By themselves neither the federal nor state governments had insufficient resources available for the construction of secondary roads, making the cooperation with the private sector indispensable.

By 1970, the network reached 71.500 km, principally federal and state axles, which formed a kind of mesh touching the main points but still having a lot of voids. There were not feeder roads. The longitude resulted insufficient to communicate close to 100.000 populations spread out over the national territory.

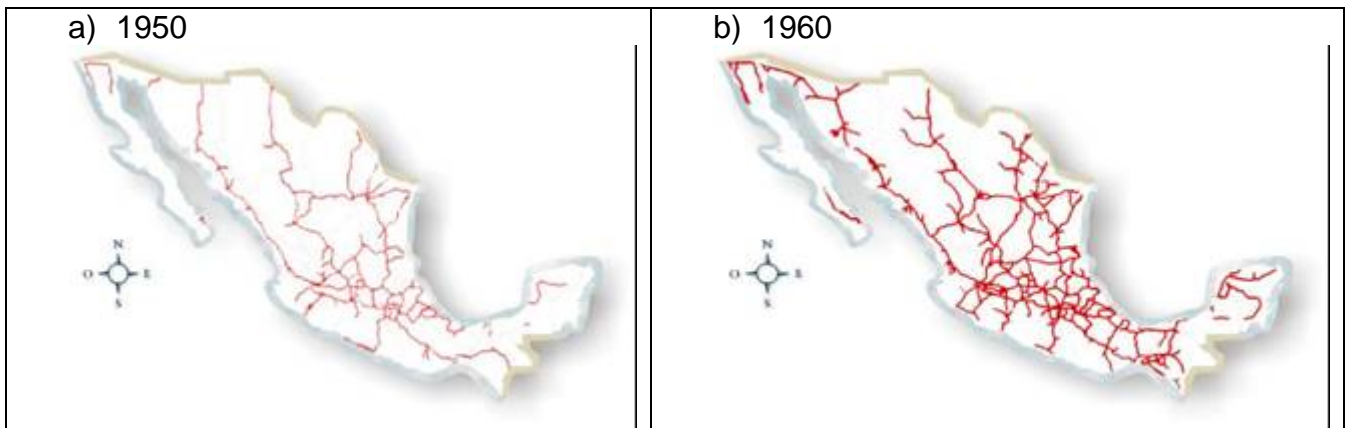


Figure 3. Mexican road network in 1950 and 1960.

#### 4. MANUAL LABOUR ROADS

In 1970, it was advertised that the biggest part of the roads planned and constructed for a daily movement of 2.500 vehicles, registered a transit of less than 500. It was concluded that apart from a few exceptions, the network had been designed and built with specifications above the country needs. This led to think that the problem to resolve was at that time geographic communication and not traffic congestion, and then in 1971 a distinct policy from the one previously applied was defined: give preference to modest roads over big highways. In fact, near to the principal corridors there were tens of thousands of medium and small populations in which lived millions of Mexicans without adequate access to a road network, because they used roads of poor technical characteristics, which become impassable during the rain season.

The program of Manual Labour proposed to give these roads a technical treatment such as improvements in their alignment, drainage and surface, using for this purpose peasant labour that was not occupied in the months without agricultural work, and assuming that such roads would have low traffic, less than 500 vehicles a week. They were then economic roads, constructed on a large scale which made the network grow to 125.000 km in 1976 to almost 200.000 km in 1980, from which 61.000 km had been paved.

To organize the labour force throughout the country for the construction of these roads, and later for their maintenance, was a great achievement of the Manual Labour Road Program. The program allowed the improvement of trails in the less accessible regions populated by peasants and marginalized indigenous communities.

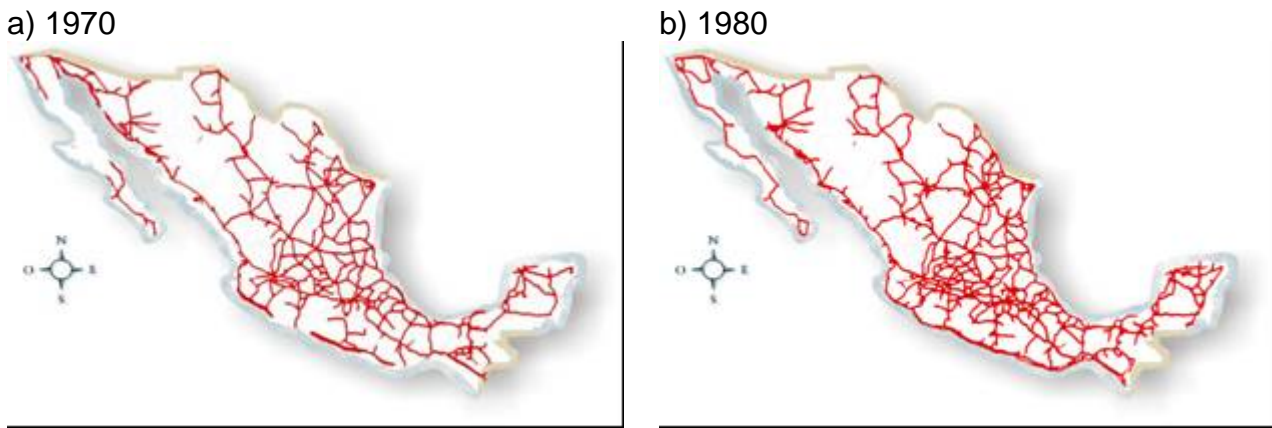


Figure 4. Mexican road network in 1970 and 1980

## 5. TOWARDS A MODERN MEXICO

The Figure 5 shows Mexico's current federal road network and trunk corridors. The extension of the network now is more than 349.000 km from which 33.5% are paved. From the paved network, the 91% are two lane roads and the 9% are 4 or more lane roads.

Table 1 presents a comparison between the evolution of the total network length and the corresponding one to four or more lane roads.

<b>Year</b>	<b>Total road network length, km</b>	<b>4 or more lanes road length, km</b>
1925	0	0
1930	1.500	0
1940	10.000	0
1950	26.000	120
1960	34.000	200
1970	71.500	400
1980	200.000	1.000
1990	240.000	5.500
2000	300.000	10.000
2006	340.000	11.000

Table 1. Historical evolution of the 4 or more lane road length.

Regarding the jurisdiction of roads, 13.8% of the network is federal, 21.4% is operated by the states, 45.7 are rural roads and 15.9% are improved trails.

In Mexico the transport sector is the fourth activity, with the transport of freight and passengers generating 80% of the brute added value. Figure 6 shows the dynamic evolution of the road network in Mexico, as a function of the political, social and economic aspects that prevail in each particular period and related to the road development. It can be noted that 1970 represents an inflection point from which an explosive growth in road network occurred, which coincides with a relevant development in tourism and, above all, in the petroleum industry.

The present coverage of the network is more than 75%, which though it is important, for a country of 2 millions square kilometers, represents certain delays in the south east region of the Mexican Nation.

The percentage of the network utilized by more than 1.500 vehicles per day is currently more than 35%, but in 1970 was only 6%.

a) Federal road network

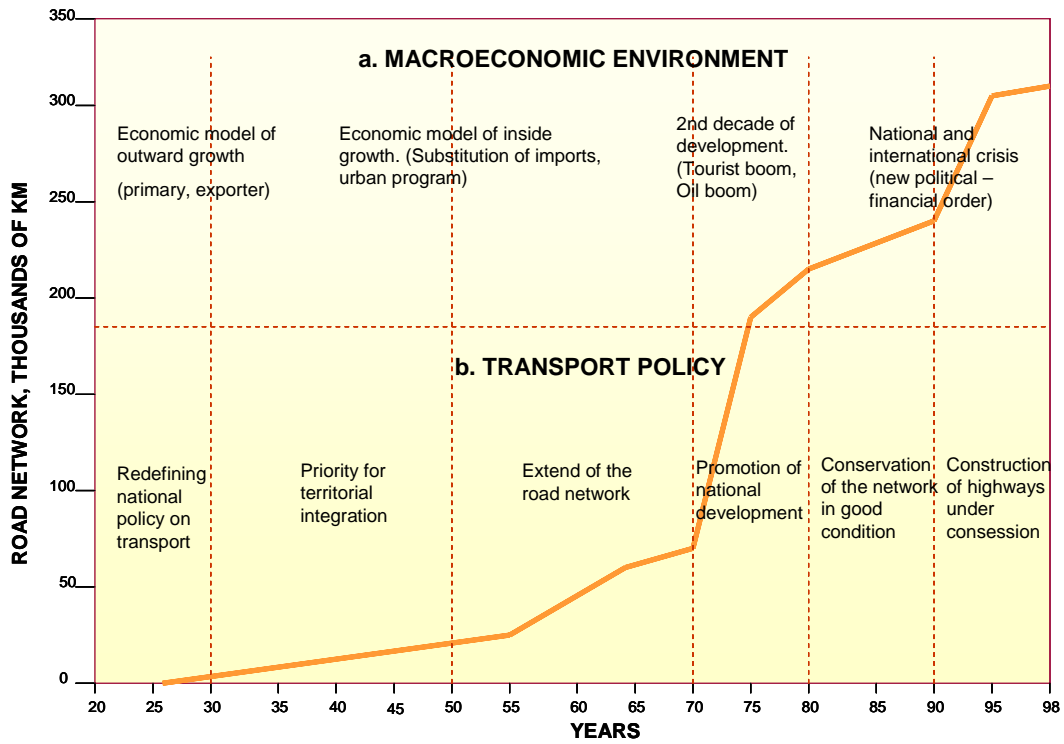


b) Road corridors



Figure 5. Present distribution of Mexican road network and corridors.

a)



b)

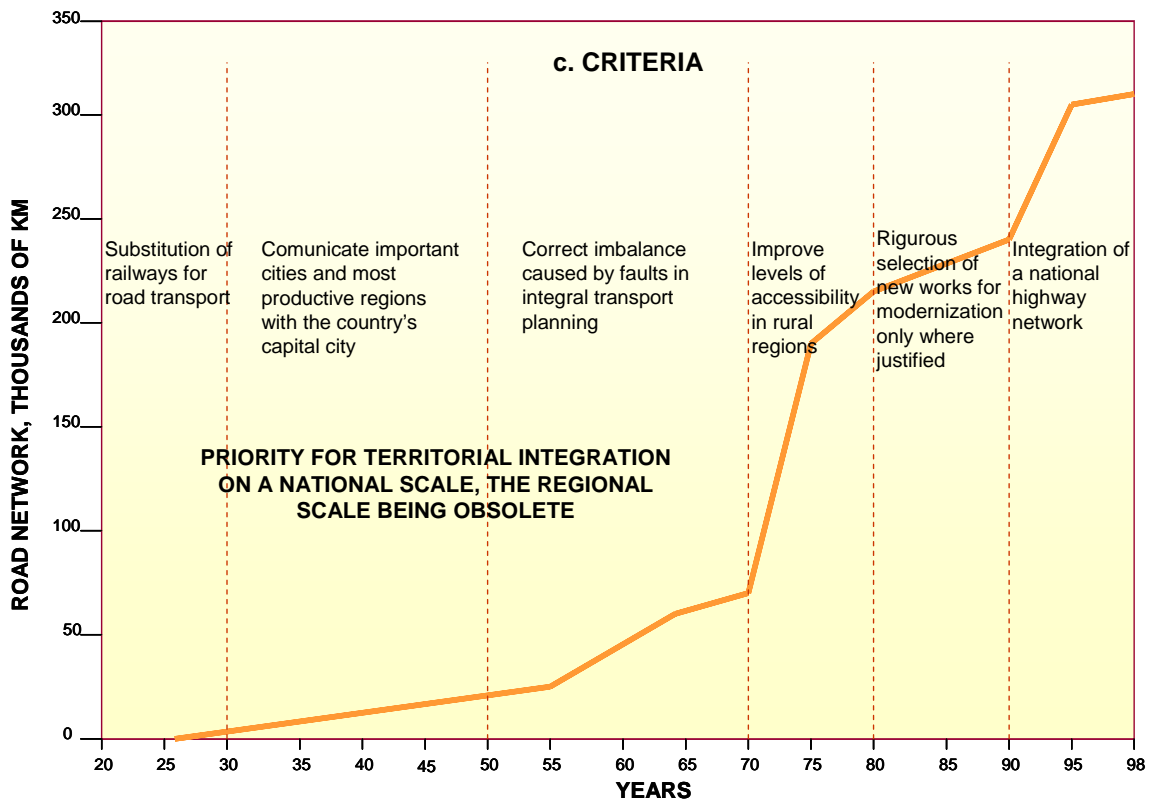
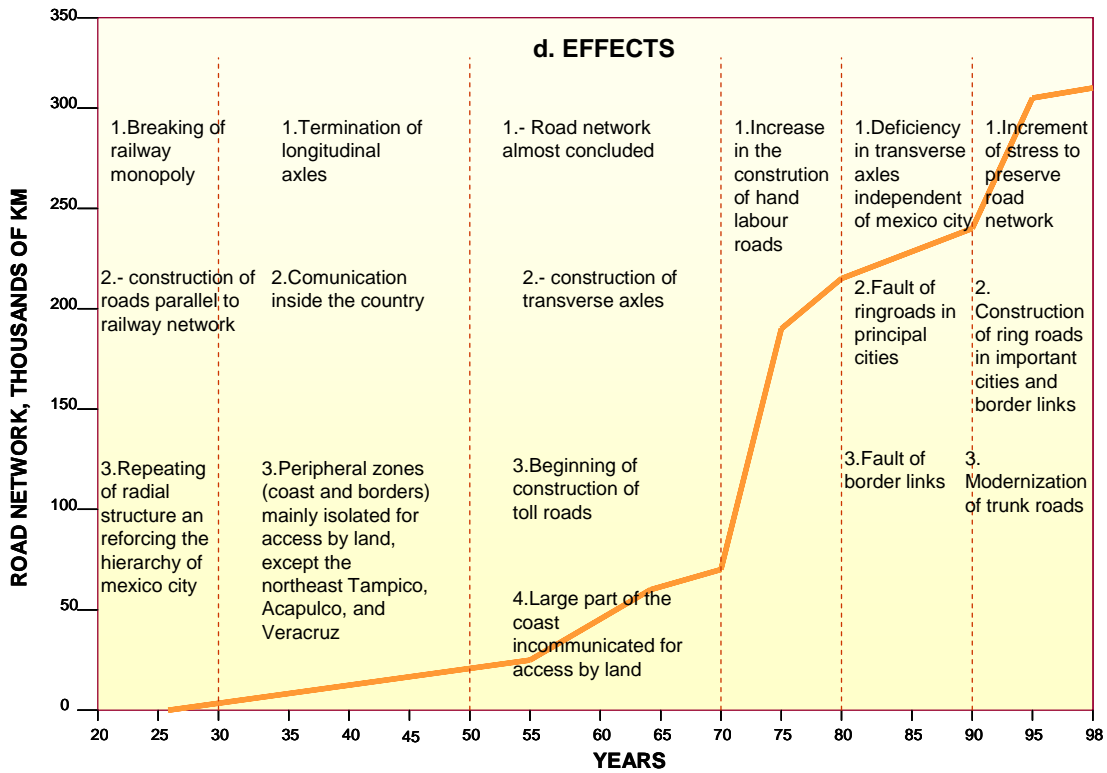


Figure 6. Dynamics of the evolution of the Mexican road network: relation of evolution and macroeconomic panorama, transport policy and political criteria.



a)



b)

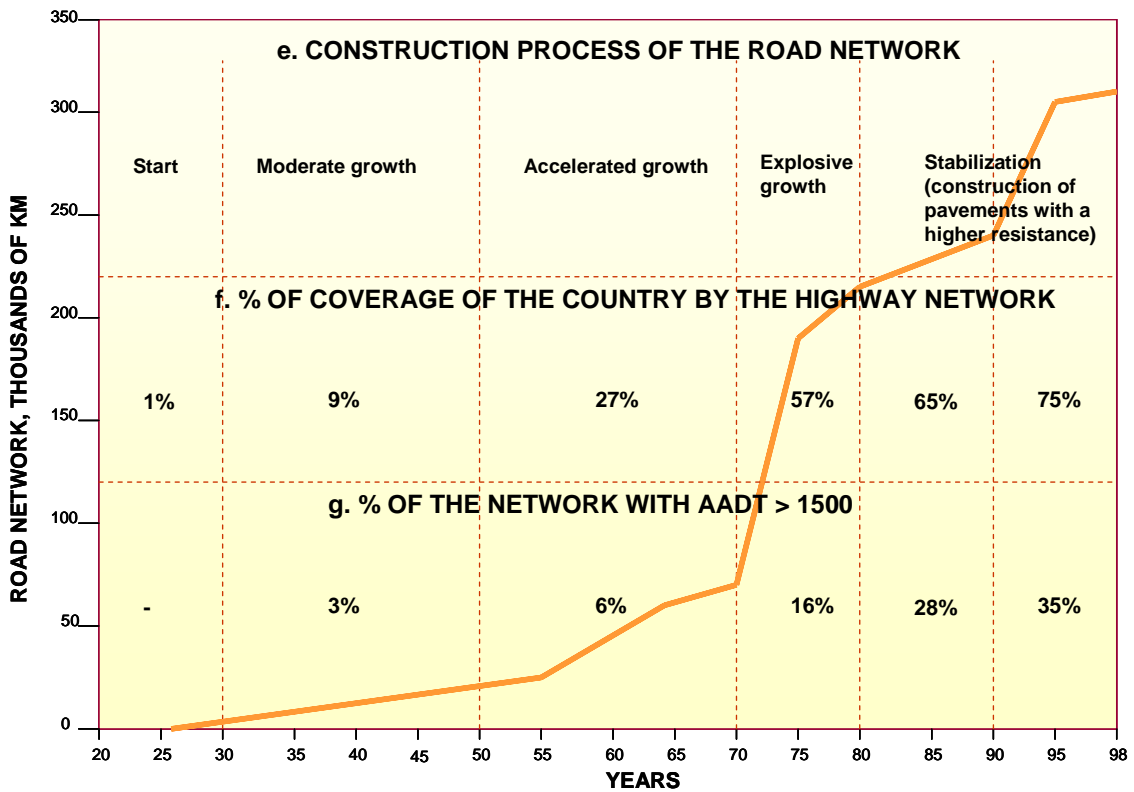


Figure 7. Dynamics of the evolution of the Mexican road network: relation of evolution with observed effects and some indicators.

## 6. ON THE THRESHOLD OF THE NEW MILENIUM

The new generation of Mexicans who look to the new millennium have learned to live in a world of rapid changes, relative uncertainty and insecurity. These conditions affect affects everyone, both nationally and internationally.

Now, as we are closer to the Bi-Centenary of the Independence and the Centenary of the Revolution, Mexico is in a process of transformations which can not, and should not, be delayed, but should proceed with a clear direction of progress.

Roads are not only a means of communicating the northern and southern borders, or the Pacific and Atlantic oceans. They are a means of communicating too those Mexicans between regions which are terribly unequal. They are also a means of communicating our present with the future of the country.

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