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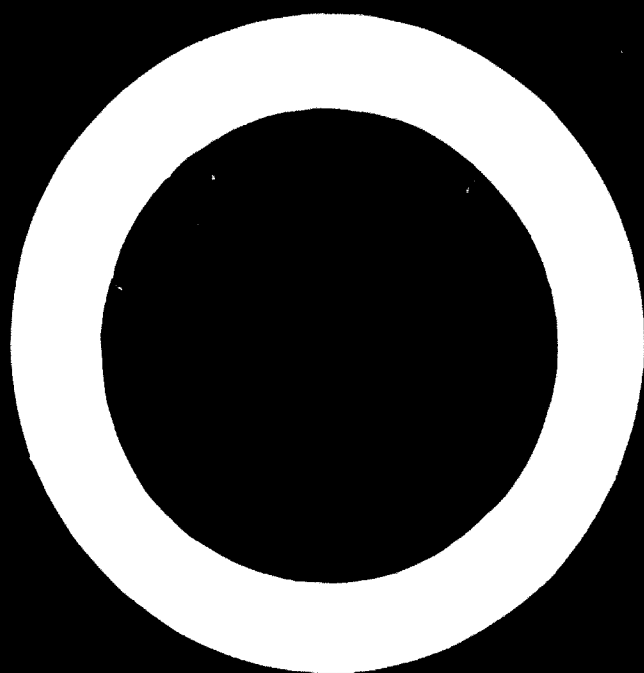
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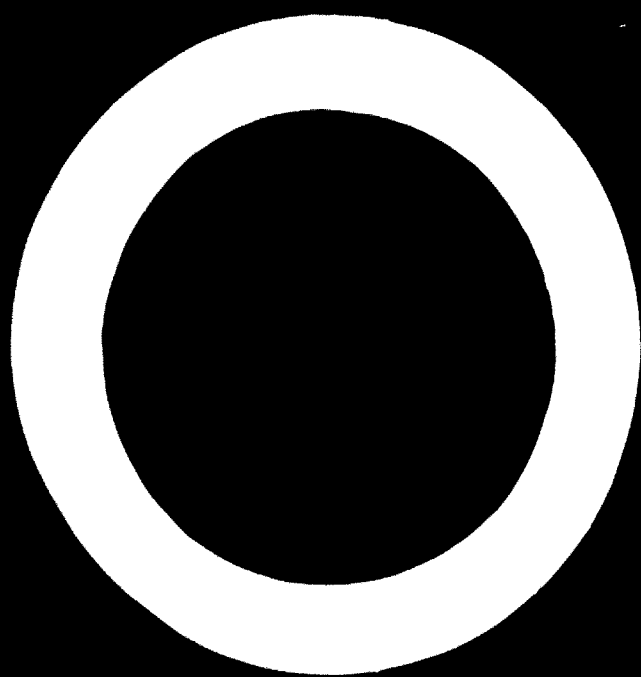
**Perspectives for Industrial Development
in the
Second United Nations Development Decade**

**THE
MOTOR
VEHICLE
INDUSTRY**

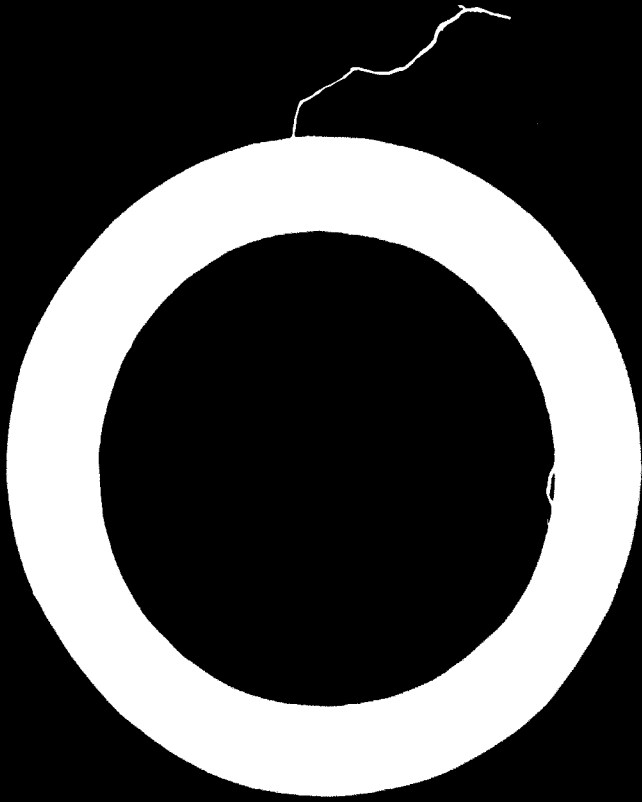


UNITED NATIONS





THE MOTOR VEHICLE INDUSTRY



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
VIENNA

PERSPECTIVES FOR INDUSTRIAL DEVELOPMENT IN THE
SECOND UNITED NATIONS DEVELOPMENT DECADE

THE MOTOR VEHICLE INDUSTRY



UNITED NATIONS
New York, 1972

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FOREWORD

In the first years of the Second United Nations Development Decade, UNIDO will devote increasing attention to those problems of industrial development for which the planning time span is some five years or more. Such problems are often among the most difficult to solve. The research necessary to devise appropriate measures may take considerable time, apart from the lengthy period required for the measures to produce their full effects. Most projects for technical assistance to a developing country are of much shorter duration than five years, and while they are being devised and implemented there is some risk of putting insufficient emphasis on long-term measures.

It is not intended that UNIDO should interrupt the rhythm of its established technical assistance activities in order to give more intensive study to the problems of longer-term planning. On the contrary, an important part of the new programme will consist of taking stock of past experience to see what lessons can be drawn for the benefit of future work programmes. It is particularly important to identify certain common factors that affect the operation of the majority of projects and to evaluate their influence. It is through such factors that the progress of a large project in one branch of industry can interact on the progress of other large projects in the same or in another branch.

The most intractable difficulties experienced by the developing countries and the experience in meeting these difficulties will be a challenge to all who aim to accelerate the pace of their industrial development. These difficulties must be subjected to fresh analysis. To surmount them, new, imaginative ideas have to be propounded and new policy measures developed.

As an essential part of its Second Development Decade activities, UNIDO is publishing a series of papers on trends and prospects in the developing countries of some of the main branches of industry during the 1970s. These papers should serve as preparatory material for workshops and seminars at which the proposals will be more widely debated, or for a series of regional meetings at which the recommendations will be given more precise form. The papers will normally include forecasts of consumption and production up to 1980. It goes without saying that accurate predictions cannot be made for ten years ahead. Nevertheless, quantitative forecasts help to illustrate and orient the text. No attempt will be made to impose on the consultants who collaborate in preparing these forecasts a uniform methodology or set of assumptions.

In accordance with the international development strategy for the Second United Nations Development Decade,¹ manufacturing output in the developing

¹ General Assembly Resolution 2626 (XXV).

countries should be increased by an average of 8 per cent yearly. To achieve this target, some complex problems must be resolved in the fields of planning, finance, management and implementation. In particular, it is essential to take full account of factors whose effects are felt only in the long term, as was stressed in the recently published "Study of the Capacity of the UN Development System".² It is hoped that the papers in the new UNIDO series will make a contribution to the long-range industrial development strategy of Governments and to the work of UNIDO and of other United Nations bodies concerned.

The motor vehicle industry is the subject of this second paper in the series. (More exactly, the paper deals with road motor vehicles other than motorcycles and motorized cycles.) It is, of course, true that no branch of industry can be developed in isolation. Motor vehicle manufacture, however, requires and helps to generate the development of enterprises for the manufacture of a particularly wide range of high-quality products, especially in the engineering field. In the process, a general rise in the level of technology is achieved which is a permanent asset for promoting the country's continuing industrial development.

The economic and social development of a country depends—in all sectors, not merely in the industrial sector—on an adequate infrastructure of transport and communications facilities. Road transport equipment is a substantial part of this infrastructure, particularly in developing countries with restricted railway networks. These facts lend special significance to a study of the prospects for local manufacture of motor vehicles.

The motor vehicle industry always remains an assembly industry in the technical sense that the enterprise selling the complete product finds it economic to purchase from other manufacturers a considerable proportion of the parts, items of equipment and accessories incorporated in a modern vehicle. This is a situation which inherently provides opportunities for international—and sometimes regional—co-operation in production and selling.

It should also be pointed out that 47 developing countries already have motor vehicle industries, although most have not progressed far beyond the assembly of kits of parts imported from the licensor's parent factory. There are therefore advantages in attempting a critical survey of what has been achieved and what has sometimes gone wrong (see chapter 3). It is also appropriate to devote at least as much attention, in framing an action programme, to the improvement of existing motor vehicle industries as to the creation of new ones (see chapter 4).

Enough has been said to make it evident that the Governments of most developing countries need to bring the motor vehicle industry under review in connexion with some aspect or another of their development policies.

This paper was prepared by Mr. Fernand L. Picard, formerly Director of Research and Development, Régie nationale des Usines Renault, Boulogne-Billancourt, France, as consultant, in co-operation with the UNIDO secretariat.

² *A study of the capacity of the United Nations development system* (United Nations Publication DP/5), United Nations, Geneva, 1969. See, for example, chapter five, "The United Nations Development Co-operation Cycle".

CONTENTS

	<i>Page</i>
<i>Chapter 1</i> REASONS FOR ESTABLISHING A MOTOR VEHICLE INDUSTRY	1
Survey of the motor vehicle situation	1
Arguments for and against	10
<i>Chapter 2</i> FORECASTS OF DEMAND AND PRODUCTION IN DEVELOPING COUNTRIES IN 1980	14
Methodology	14
Review of the state of the motor vehicle industry in individual countries and forecasts according to alternative A	18
Area 1: The Caribbean and Latin America	18
Areas 2 and 3: Asia, excluding the Middle East	22
Area 4: North Africa and the Middle East	24
Area 5: Africa south of the Sahara	26
Area 6: Oceania	29
Summary of forecasts (alternative A) by area	30
The effect on forecast demand and production in 1980 of assuming 6 per cent minimum annual growth in the GNP of the developing countries (alternative B)	32
<i>Chapter 3</i> CRITICAL REVIEW OF THE ESTABLISHMENT OF MOTOR VEHICLE INDUSTRIES SINCE 1950	39
General considerations	39
The criticisms made and their causes	40
Conclusions to be drawn from analysis of the causes of criticism	44
<i>Chapter 4</i> ACTION PROGRAMME FOR THE MOTOR VEHICLE INDUSTRY IN DEVELOPING COUNTRIES	51
Introduction	51
Improvement of existing motor vehicle industries	52
Creation of a new motor vehicle industry	57
The role of the United Nations Industrial Development Organization (UNIDO)	71
<i>Annex</i> FURTHER NOTES ON THE FORECAST OF DEMAND IN 1980	73
Population and GNP forecasts for 1980	73
Forecasts of the number of vehicles in use in 1980	74
Forecasts of new registrations of motor vehicles	76
The margins of error in the forecasts	84

LIST OF TABLES

	<i>Page</i>
1. Motor vehicle density and average income, 1968	4
2. Motor vehicle production in 1969: principal manufacturing countries and world total	6
3. Motor vehicle exports from the six major producing countries in 1968	9
4. Forecast A of motor vehicles in use and new registrations in developing countries -- Area 1: The Caribbean and Latin America	20
5. Forecast A of motor vehicles in use and new registrations in developing countries -- Area 2: South-East Asia, Area 3: The rest of Asia, excluding the Middle East	23
6. Forecast A of motor vehicles in use and new registrations in developing countries -- Area 4: North Africa and the Middle East	25
7. Forecast A of motor vehicles in use and new registrations in developing countries -- Area 5: Africa south of the Sahara	28
8. Forecast A of motor vehicles in use and new registrations in developing countries -- Area 6: Oceania	29
9. Motor vehicles in use and new registrations: Summary by area	30
10. Area analysis of motor vehicle industries and forecast of new registrations (alternative A)	30
11. Forecast B of motor vehicles in use and new registrations in 1980 -- Area 1: The Caribbean and Latin America	33
12. Forecast B of motor vehicles in use and new registrations in 1980 -- Area 2: South-East Asia, Area 3: the rest of Asia, excluding the Middle East	34
13. Forecast B of motor vehicles in use and new registrations in 1980 -- Area 4: North Africa and the Middle East	35
14. Forecast B of motor vehicles in use and new registrations in 1980 -- Area 5: Africa south of the Sahara	36
15. Forecast B of motor vehicles in use and new registrations in 1980 -- Area 6: Oceania	37
16. Comparison of alternative forecasts for motor vehicles in use and new registrations in 1980, by area	37

LIST OF TABLES (continued)

	<i>Page</i>
A-1 Population and <i>per capita</i> GNP—Area 1: The Caribbean and Latin America	74
A-2 Population and <i>per capita</i> GNP—Area 2: South-East Asia, Area 3: The rest of Asia, excluding the Middle East	75
A-3 Population and <i>per capita</i> GNP—Area 4: North Africa and the Middle East	76
A-4 Population and <i>per capita</i> GNP—Area 5: Africa south of the Sahara ...	77
A-5 Population and <i>per capita</i> GNP—Area 6: Oceania	78
A-6 Cars, CV and PSV in use—Area 1: The Caribbean and Latin America	79
A-7 Cars, CV and PSV in use—Area 2: South-East Asia, Area 3: The rest of Asia, excluding the Middle East	80
A-8 Cars, CV and PSV in use—Area 4: North Africa and the Middle East	81
A-9 Cars, CV and PSV in use—Area 5: Africa south of the Sahara	82
A-10 Cars, CV and PSV in use—Area 6: Oceania	83

EXPLANATORY NOTES

Reference to tons indicates metric tons, and to dollars (\$) United States dollars, unless otherwise specified.

Dates divided by a slash (e.g. 1960/1961) indicate a crop year or a financial year.

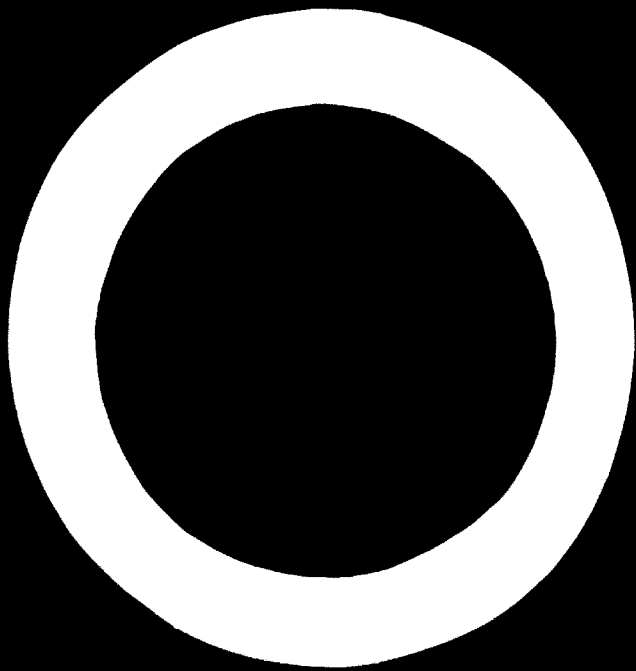
Dates divided by a hyphen (e.g. 1960—1965) indicate the full period involved, including the beginning and end years.

In statistical tables a dash (—) indicates that the amount is nil or negligible, and three dots (...) indicate that data are not available or are not separately reported.

Although the calculations regarding motor vehicles have been carried out to the nearest unit, the results have been rounded. There are thus some discrepancies in the tables between the sum of individual rows and columns and the totals shown.

The following abbreviations are used in this publication:

CV	commercial vehicles
CKD	completely knocked down
EEC	European Economic Community
GNP	gross national product
OECD	Organization for Economic Co-operation and Development
PSV	passenger service vehicles
SKD	semi-knocked down
4 × 4	4-wheel drive vehicle
6 × 6	6-wheel drive vehicle
8 × 8	8-wheel drive vehicle



REASONS FOR ESTABLISHING A MOTOR VEHICLE INDUSTRY

Survey of the motor vehicle situation

The development of road transport

The need for motor vehicles becomes incontestable as soon as the development of an economy reaches a certain level, in order to transport materials and products needed for operation of the economy, and also people, as a consequence of their activities in general, quite apart from their leisure pursuits and the needs of tourism.

Every economic activity calls for the transport over shorter or longer distances of raw materials for production, building materials or finished products. Essential transport activities include the following:

In agriculture, the transport of fertilizers from factories to agricultural land, of harvests to markets or to storage silos and of milk and farm produce to villages and towns;

In building and civil engineering, the transport of excavated material and building materials from quarries to factories and construction sites;

In industry, the transport between factories of primary and intermediate products, of machine tools and other factory equipment; also, the transport of finished products from factories to points of sale, and from these to the customers' homes;

In the fuel and power sector, the transport of coal and crude oil from mines and wells to electric power stations and refineries, and of gasoline, diesel fuel and lubricating oils from refineries to distribution points throughout the territory.

The magnitude of these transport operations is broadly related to the level of economic activity (as reflected by the gross national product). Transport can obviously be carried out by means other than motor vehicles, but:

In developing countries, the infrastructure is often totally lacking, whether one thinks of railways, ports, canals, roads or oil pipelines, and the simplest and fastest method, pending the establishment of these means of transport

and during their construction, is still to use cross-country-type vehicles which can pass along tracks or even traverse open country:

Motor vehicle transport makes possible direct conveyance, without unloading and reloading, from place of production to place of use; in the case of other means of transport, reloading can only exceptionally be avoided and hence road transport results in useful savings of cost and time in the case of perishables (fruits, vegetables, milk, meat, fish, etc.):

Investment in roads is lower than for laying railway tracks and building canals which, owing to the technical requirements for trains and ships, necessitates substantial engineering work (tunnels, viaducts, locks) in countries with mountainous terrain:

Lastly, the experience of the developed countries shows that road is everywhere constantly gaining ground on rail for the transport of materials which are not heavy, and in particular for industrial and food products.

Goods transport operations call for vehicles suitable for the materials conveyed, i.e., as appropriate, platform lorries, tipper lorries, tankers, refrigerated vans, cattle trucks, crane carriers, etc.

Passenger transport is also a function of economic activity, the number of passengers and of journeys increasing markedly with the development of industry. In other words, there is the conveyance of people from their homes to their places of work in towns (offices, shops, etc.) or in the country (mines, quarries, construction sites, factories). In addition, there is the transport of health services personnel for medical work and of government personnel engaged in maintaining order, supervising the economic life of the country, etc. In many countries an important element is the conveyance of tourists from airports or railway stations to hotels and from hotels to the sights which have attracted them (and their much-sought-after foreign exchange) to the country.

At the outset, passenger transport tends to be organized as a public, collective service by public authorities or by private companies. Where there is no infrastructure, it is again the case that motor vehicles enable the problem to be solved with minimum investment and maximum flexibility of operation. The number of seats in buses and coaches will be decided in relation to the traffic to be handled, and routes and schedules will be fixed in the light of the distribution of population.

Road transport, in combination with commercial aviation, should enable the developing countries to compensate for the absence of railways, reserving journeys of more than 400 km for aviation and the shorter journeys in between for buses and coaches.

Individual transport by private car tends at the outset to be reserved for missions of public interest that involve journeys by individual people and for emergency transport. As the economy develops, it is advisable that complete freedom should be granted for the purchase of private cars without, however, allowing excessively liberal credit facilities to create a serious cause of inflation.

For businessmen, the use of individual cars multiplies activity by a factor of approximately 40 compared to walking, and by 10 compared to travel on

horseback, because of the savings in travel time and the increase in territorial area which can be canvassed.

Lastly, travelling means becoming acquainted with other lands and other people. In this sense, the automobile is a means of communication and progress and a powerful tool for peace and brotherhood.

Motor vehicles in use on 1 January 1969

From the statistical point of view, motor vehicles are divided into three categories, as follows:

Passenger cars (abbreviated, cars) -- motor cars with a maximum of six seats, whatever type of body they may have (limousine, station wagon, break, etc.);

Commercial vehicles (abbreviated, CV) -- all vehicles designed and equipped for goods transport whatever their carrying capacity may be (lorry, van, jeep, pick-up, etc.).¹

Passenger service vehicles (abbreviated, PSV) -- public transport vehicles with more than six seats, whether intended for city transport (buses) or long-distance or tourist travel (coaches).

The most reliable statistics reported a world total (with certain omissions, see table 1) on 1 January 1969 of 216,269,200 vehicles.² Nearly 170 million (i.e. 78.5 per cent of the total) were cars. Compared with the world totals on 1 January 1968 and 1 January 1965, the increase was 6.7 per cent and 30.4 per cent, respectively.

It must be pointed out that statistics of the number of vehicles reflect the real situation imperfectly since, depending on the case:

One vehicle can represent a car, CV or PSV;

A car may be a "mini" or a Cadillac;

A CV may be a light van to carry 250 kg or a 20-ton heavy lorry;

A PSV may be an 8-seat microbus or a 50-seat coach

Statistics according to vehicle weight would give a more complete picture. Value statistics would be even less precise than numbers as an indicator, owing to the difficulties surrounding attempts to make a meaningful conversion into a common currency of prices ruling in different countries and expressed in different currencies.

The impression given by the statistics in terms of number particularly underemphasizes the position of the United States, where the average car weighs 1,500 kg, is 4.40 m long and has an engine with a 5-litre cylinder capacity, as compared with the European average of 800 kg weight, 3.10 m length and 1.2-litre engine.

¹ Buses and coaches are generally included in the definition of commercial vehicles but are treated here as a separate category.

² The time of year to which statistics of the number of vehicles in use relate varies from country to country, but is 31 December in a large number of cases. For convenience in forecasting, all these statistics are assumed to relate to 1 January next following.

The ten countries with the largest number of vehicles in use were the following:

United States	101,039,113
France	13,220,000
Germany, Fed. Rep.	13,113,793
United Kingdom	12,786,310
Japan	12,482,266
Italy	8,976,558
Canada	7,539,167
USSR	5,325,000
Australia	4,281,757
Spain	2,253,519
Total	181,017,493

These countries accounted for 83.6 per cent of the world total, with the USA alone accounting for 46.6 per cent. The distribution of vehicles in use by continent is shown in table 1, together with *per capita* gross national product (GNP). The economic development and the vehicle density of each continent are clearly related.

TABLE 1. MOTOR VEHICLE DENSITY AND AVERAGE INCOME, 1968

Region or country	Vehicles in use			Per capita GNP in dollars
	Thousand units	Per cent of world total	Per thousand inhabitants	
Africa	4,028.4	1.9	12.0	178
America:				
North	108,578.3	50.2	500.4	4,249
Central ^a	2,629.5	1.2	30.2	474
South	6,644.2	3.1	37.0	419
Asia ^b	16,769.5	7.8	14.4	151
Europe: market economies	64,085.3	29.6	191.9	1,850
Europe and USSR: centrally planned economies	8,105.8	3.7	23.8	...
Oceania	5,375.1	2.5	300.0	1,940
World Total ^{a,b}	216,216.1	100.0	80.2	...
of which:				
United States	101,039.1	46.7	502.3	4,379
OECD (Europe)	62,803.1	29.0	192.8	1,857
EEC and United Kingdom	52,693.8	24.4	218.1	2,008
Developing countries ^{a,b}	15,079.8	7.0	9.1	191

Sources: *Automobile Facts and Figures 1970*, Automobile Manufacturers Association, Inc., Detroit, supplemented by French sources in regard to French Polynesia. In subsequent tables these data on vehicles in use are assumed to apply to 1 January 1969.

^a Including Mexico and excluding Cuba.

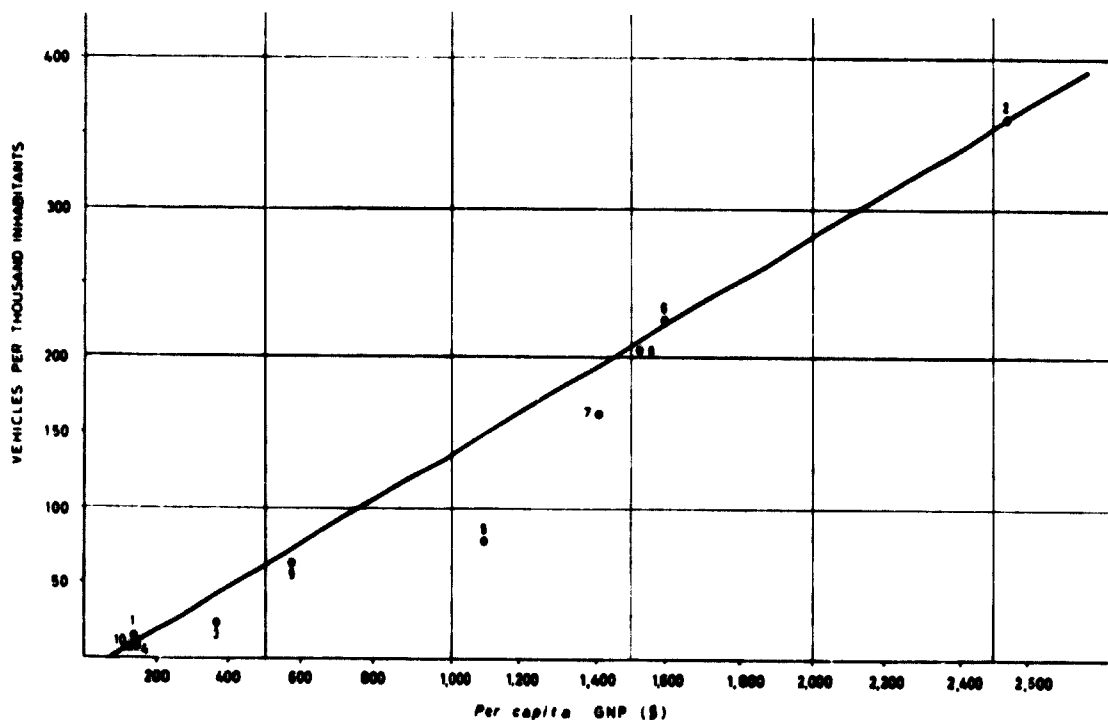
^b Excluding Republic of Yemen and centrally planned economies of Asia.

It should be noted that for the United States, the country which is the most highly motorized and has the highest *per capita* GNP, the number of vehicles amounted to 502.3 per thousand inhabitants (1.99 inhabitants per vehicle).

For the European members of the Organisation for Economic Co-operation and Development (OECD)³ the figure was 192.8 vehicles per thousand inhabitants with an average *per capita* income of \$1,857 in 1968; for the countries of the European Economic Community (EEC) together with the United Kingdom it was 218.1 for an average income of \$2,008 per head.

For the developing countries, with the exceptions noted in table 1 the total number of motor vehicles was 15,132,900 for 1,663 million inhabitants, i.e. an average of 9.1 vehicles per thousand inhabitants. Their average *per capita* income is estimated at \$190.

Vehicle density is plotted against *per capita* GNP in the figure below. All the points lie close to the straight line passing through the points representing Asia at one extreme and Northern and Central America at the other, except the point for Europe. The policy in regard to motorization pursued by the centrally planned economies is no doubt the main reason for this exception.



Vehicle density in relation to GNP

- | | |
|---------------------------------|-----------------------------|
| ● 1 — Africa | ● 6 — Oceania |
| ● 2 — North and Central America | ● 7 — OECD (Europe) |
| ● 3 — South America | ● 8 — EEC + United Kingdom |
| ● 4 — Asia | ● 9 — World |
| ● 5 — Europe | ● 10 — Developing countries |

³ Austria, Belgium, Denmark, France, Germany (Fed. Rep.), Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden and Switzerland.

Motor vehicle production in 1969

Production amounted to 29,721,500 motor vehicles in 1969, including 23,027,400 cars (77.5 per cent of the total) and 6,694,100 CV and PSV (see table 2). The total represented an increase of 5 per cent in comparison with 1968 and of 37.3 per cent in comparison with 1964; 1966 and 1967 were years of stagnation and even, as regards 1967, of slump.

TABLE 2. MOTOR VEHICLE PRODUCTION IN 1969: PRINCIPAL MANUFACTURING COUNTRIES AND WORLD TOTAL

	Production (thousand units)			Number of manufacturers		
	Cars	CV and PSV	Total	Cars	CV and PSV	Total
United States	8,224.3	1,980.7	10,205.0	4	8	10
Japan	2,611.5	2,062.8	4,674.3	9	12	12
Germany, Fed. Rep. of ...	3,312.5	292.0	3,604.5	11	11	17
France	2,168.4	290.8	2,459.2	5	6	8
United Kingdom	1,704.9	477.9	2,182.8	5	5	5
Italy	1,477.4	118.6	1,596.0	6	3	6
Canada	1,036.2	314.5	1,350.7	4	4	5
USSR	293.6	550.7	844.3	a	a	a
Spain	379.1	75.3	454.4	5	7	7
Australia	350.0	50.0	400.0	5	4	5
Brazil	240.0	108.0	348.0	3	5	5
Belgium	283.5	27.6	311.1	4	2	4
Sweden	242.9	27.8	270.7	2	2	3
Argentina	156.0	60.0	216.0	7	7	7
Sub-total	22,480.3	6,436.7	28,917.0	70	76	94
World total	23,027.4	6,694.1	29,721.5

Source: *Automobile Facts and Figures 1970*, Automobile Manufacturers' Association, Inc., Detroit.

a A sizable number of manufacturing units exists in the USSR; the figures available are not strictly comparable with those given for the other countries listed in the table.

The motor vehicle industry is one of the most concentrated in the world; fourteen countries, each of which produces more than 200,000 vehicles a year (roughly 100 an hour), account for 97.3 per cent of world production (97.6 per cent of car and 96.2 per cent of CV and PSV production—see table 2). Production in these fourteen countries is in the hands of 94 manufacturers, 70 of whom manufacture cars and seventy-six manufacture CV and PSV.⁴

The first seven of these countries alone, each of which produces more than 1 million motor vehicles a year, contain 63 manufacturers and in 1969 accounted for 87.8 per cent of world production (89.4 per cent of all cars and 82.3 per cent of all CV and PSV).

⁴ These totals exclude the specialist coach builders, who purchase PSV chassis from manufacturers.

If we consider the situation in 1969 with regard to the major international manufacturers, we find that:

The three groups in the United States, i.e. General Motors, Ford and Chrysler, with their many subsidiaries throughout the world, manufactured 14,234,864 vehicles, or 48 per cent of the total.

The ten largest manufacturers (General Motors, Ford, Chrysler, Volkswagen, Fiat, Toyota, Nissan, Renault, British Leyland Motors and Toyokogyo), with their various subsidiaries, manufactured 23,075,350 vehicles, or 78 per cent of the total.

The total production or assembly of vehicles by developing countries in 1969 slightly exceeded 1.1 million (3.8 per cent of world production). If we confine ourselves to developing countries where the domestic content of the vehicles is 30 per cent or more, their combined output is less than 3.3 per cent of the world total.

It should also be pointed out that the ratio between total production and the total number of vehicles in use is relatively stable. In the past five years, it has ranged from 12.8 to 13.5 per cent, with the exception of 1967, when it was 12.0 per cent owing to the decline in production in that year. A similar stability is observable if the ratio is calculated for cars or for CV and PSV; the percentage for the latter group exceeds that for cars by 0.7 to 0.9 in every recent year.

The trend towards concentration is actively continuing in all the major manufacturing countries, where, particularly in recent years, mergers have taken place or co-operation agreements have been reached. The purpose of these financial or technical arrangements is to reduce costs by reducing the number of models and establishments and to increase production volume in order to improve the effectiveness of the means of production and distribution.

With only four companies manufacturing cars and a production of 8,224,327 cars, the United States provides an extreme example of this concentration. (In 1925 there were 150 car manufacturers in the country.)

Production in the developing countries

We have seen that the motor vehicle production and assembly of the developing countries accounted in 1969 for only 3.8 per cent of the total number of vehicles produced, while the number of vehicles in use in those countries accounted for 6.9 per cent of the world total.

These simple figures fail to reflect accurately the complexity of the current situation. The production of motor vehicles in developing countries takes four fairly distinct forms:

Vehicles manufactured entirely in the country;

Vehicles assembled from CKD kits with the incorporation of some domestic products (accessories, items of equipment, parts);

Vehicles assembled entirely from imported CKD kits;

Vehicles which incorporate only the labour of final assembly of imported SKD kits.

Statistics do not at present allow the total production figure to be broken down into these four categories. Production in Argentina, Brazil, India and Spain, for example, is more than 95 per cent of domestic origin; it takes place under licence from major international manufacturers and, in the case of Spain, part of the production is of domestic design. However, some idea of the volume of vehicle assembly from CKD kits can be gained from the following information:

The number of assembly contracts in operation increased from 170 at the end of 1960 to 430 at the end of 1968, i.e. by more than 150 per cent;

The number of countries carrying out assembly was 70 at the end of 1968, compared with 42 at the end of 1960 and 59 at the end of 1967;

At the end of 1968, 50 new projects for vehicle assembly were under study; British Leyland Motors, for example, makes 50 per cent of its exports in the form of CKD kits;

Renault exported 210,000 vehicles in CKD form in 1967, out of a total production of 777,468 and exports of 354,430.

Manufacturers in all the major producing countries have found it necessary to adopt this policy. Those based in the United States, with the collaboration of their subsidiaries in Australia, the Federal Republic of Germany and the United Kingdom, have 133 assembly contracts in 43 countries. French manufacturers have 77 assembly contracts in 39 countries, while the Japanese have 59 in 28 countries (compared with only 7 in 6 countries in 1962) and the Italians 30 in 27 countries. Excluding the Ford and General Motors subsidiaries (whose assembly contracts are counted with those of the parent American companies), manufacturers in the Federal Republic of Germany have 56 contracts in 26 countries and United Kingdom manufacturers 48 in 34 countries.

The number of such agreements operated by a major manufacturer depends on many factors, including the geographical distribution of its exports of complete vehicles in the past, the volume of its production, and its capacity (financially and technically) to mount these complex operations.

General Motors (including its subsidiaries in Australia, the Federal Republic of Germany and the United Kingdom) have assembly contracts in 24 countries. Of these, 9 are in the Caribbean and Latin America, 6 in Asian and 2 in African developing countries.

Ford (including its subsidiaries in the Federal Republic of Germany and the United Kingdom) have assembly contracts in 32 countries. Of these, 8 are in the Caribbean and Latin America, 8 in Asian and 4 in African developing countries.

Chrysler (including its subsidiaries in France and the United Kingdom) have assembly contracts in 31 countries. Of these, 10 are in the Caribbean and Latin America, 9 in Asian and 2 in African developing countries.

Volkswagen (including its subsidiaries in the Federal Republic of Germany) have assembly contracts in 16 countries. Of these, 5 are in Latin America and 3 in Asia.

Fiat (including its Italian subsidiary OM) have assembly contracts in 28 countries. Of these, 5 are in Latin America, 5 in Asian and 5 in African developing countries.

Even manufacturers which are small by world standards have undertaken the installation of assembly lines in distant countries, sometimes with substantial financial participation. For some, this is a matter of prestige rather than of the immediate profitability of their investments. For many others, it is rather the desire to establish themselves in countries which it is hoped are destined for great development in the shorter or longer run.

World trade in motor vehicles in 1968

Under these production conditions international competition is extremely strong. A large proportion of the output of the major producing countries other than the United States is exported; in 1968, the figures were:

62 per cent for the Federal Republic of Germany

46 per cent for France

37 per cent for the United Kingdom

35 per cent for Italy

15 per cent for Japan

In contrast, only 5.2 per cent of the United States output was exported in 1968.

Since the relevant statistics are lacking in many countries, it is impossible to give figures for world imports of vehicles. However, a fairly accurate idea of the geographical distribution can be formed by considering, for 1968, the exports of the six main producing countries, which accounted for 85 per cent of world output. These countries exported 5,447,000 motor vehicles, representing 22 per cent of their production. They exported over 1.25 million vehicles to developing countries in assembled or unassembled form. Further details are shown in table 3 below. In addition, each of these countries exported kits of parts which, together with parts manufactured in developing countries, gave rise to the production of still more motor vehicles.

As regards the proportion of exports delivered to the developing countries, Japan headed the list with over 40 per cent, followed by France and the United Kingdom with around 30 per cent and Italy with 18 per cent.

TABLE 3. MOTOR VEHICLE EXPORTS FROM THE SIX MAJOR PRODUCING COUNTRIES IN 1968
(Thousand units)

Exports to:	Exports from	Germany Fed. Rep.	France	United Kingdom	Japan	Italy	United States
Africa		87.2	94.4	102.2	55.5	34.4	21.7
Americas		846.7	134.6	176.6	254.2	57.0	456.2
Asia		65.4	17.7	66.7	153.1	16.6	48.6
Europe		900.4	696.4	369.6	68.3	467.5	21.8
Oceania		19.3	11.0	103.4	81.2	9.4	9.9
Total		1,919.0	954.1	818.6	612.3	584.8	558.2

Sources: Customs statistics of the respective producing countries. For the United States, the numbers of unassembled vehicles in various categories are estimated from the dollar values.

Arguments for and against

In the situation described above, is it wise for a developing country to devote a substantial share of its human and capital resources to establishing a motor vehicle industry, when the industrialized countries possess adequate resources to supply vehicles of all types at lower prices?

In the address which he delivered at the 1969 annual meeting of the International Bank for Reconstruction and Development and of the International Monetary Fund, which took place at Washington from 29 September to 3 October Mr. McNamara "was critical of some of the policies followed by developing countries to promote industrialization . . . The result was industrial sectors that produced too wide a range of items on a far less than optimum economic scale. The resultant economic waste was vividly illustrated by a Bank study which showed that, in 1965, developing countries spent \$2.1 billion to manufacture automotive product which had a world market value of only \$800 million"⁵.

Would it not be preferable to earmark these funds for projects of general benefit and for industries necessary for agricultural development, such as drinking-water supply, dams for electricity production, silos for harvest storage, fertilizer factories, mosquito or tsetse fly eradication campaigns, irrigation of arid regions, building of schools, universities, hospitals, and so on?

It is appropriate to consider briefly at this point the reasons which militate in favour of and against establishing and developing the motor vehicle industry in developing countries.⁶

The need for cars, CV and PSV is not only one of the consequences of economic development: it is also one of the prerequisites of development, since transport is indispensable for increasing agricultural production, industrializing and improving the general level of health.

As we shall see in chapter 2, there is a certain correspondence between the number of vehicles in use *per capita* and the level of development. Economic growth requires the entry into service of additional vehicles every year. Should these vehicles be obtained by:

Purchase from abroad?

Assembly in the country from SKD or CKD kits?

Complete manufacture in the country?

Arguments for

Shortage of foreign exchange is one of the main arguments for local production. Nearly all developing countries suffer from a shortage of foreign ex-

⁵ Quoted from *Finance and Development*, No. 4, 1969, page 7.

⁶ For further details, see F. L. Picard "The rationale of the gradual development of the automotive industry from assembly of imported parts to complete local production", *Establishment and development of automotive industries in developing countries: Report and Proceedings of seminar held in Karlovy Vary, Czechoslovakia, 24 February—14 March 1969*, Part II, UNIDO, 1970 (United Nations publication, Sales No.: 70.II.B.8).

change, to an increasing extent. The value of their exports tends to be lower than that of their import needs because they have exhausted the export possibilities in their economic situation and world prices for many raw materials are declining. The latter phenomenon is frequently due to competition from synthetic materials that are cheaper—and more appropriate for the uses to which they are to be put—than the natural products.

Many international conferences have drawn attention to these problems, various United Nations bodies are tackling them. The hard fact remains that very few countries have enough foreign exchange to purchase all the manufactured goods they require from abroad and to obtain all the services required for development.

The most obvious solution appears to be to manufacture for themselves, with the assistance of the more developed countries, the goods required to meet the most pressing needs. The difficulty lies in determining priorities. Choosing between capital goods and consumer goods is an essentially political matter, which lies in the sphere of government planning. Choosing among the products of the various manufacturing sectors is a matter of quantifying the effects of alternative projects, balancing costs and benefits.

It may be claimed that the motor vehicle industry is one whose production most easily serves to generate industrial development. The rationale of this claim is explained in a paper presented at the UNIDO Seminar held in Karlovy Vary (see reference in footnote 6). Vehicle manufacture brings in its train the establishment not only of other basic industries, but also of facilities for training manpower in industrial disciplines, as well as the development of a universal concern for quality.

The development of the motor vehicle industry and of road traffic generally leads to a substantial increase in tax revenue for the Government, because of the opportunity to collect many new taxes. Customs duties can be levied on the import of machines and tools for the assembly plant, as well as the CKD kits. Other indirect taxes can be levied on domestic purchases of materials and parts for vehicle production and on sales of new and second-hand cars. Finally, there are taxes on the use of vehicles; vehicle road licences; tolls on express highways, bridges, tunnels, etc.; and taxes on fuels and lubricants. A number of these duties or taxes are, admittedly, also applied to imported vehicles. It should also be pointed out that it may be in the interest of a country to forgo some of these taxes in the early stages to promote the development of a domestic industry.

Tax collection on this scale affords an opportunity for the Government to undertake a certain redistribution of income without too much difficulty. An idea of the order of magnitude involved is given by the fact that, in the United States, the various taxes collected on the use of motor vehicles account for 26 per cent of the combined revenue of all the States (minimum: Hawaii, 7.3 per cent; maximum: Nebraska, 48.2 per cent).

It is possible to finance the construction of capital assets in the public sector (roads, express highways, schools, universities, etc.) largely through specific taxes. A public transport network can also be set up with the aid of vehicle taxes.

The jobs created by establishing a motor vehicle industry provide regular and continuing work for the young people who are entering the employment market every year a growing number as a result of population expansion and, after retraining, for adults who are compelled to change jobs by the rationalization of agricultural work. Furthermore, a motor vehicle industry can offer to young people who have followed higher courses of studies, either in the country or abroad, positions in keeping with the level of their knowledge, thus persuading them to stay in the country.

In order to ensure the training of skilled labour and technical and commercial staff for the assembly plants, vocational and technical training institutions have to be created which also serve the needs of enterprises in industry generally.

Arguments against

The counter-arguments are primarily of an economic nature and, although fewer, none the less weigh heavily in the balance.

The motor vehicle industry requires heavy investments because of the high cost of the infrastructure and machine-tool installations necessary to achieve the minimum quality standard admissible in this industry. These investments must be paid for largely in foreign exchange. Their financing raises problems which can usually be resolved only by obtaining international loans.

There is the danger of structural inflation if an industry is established that is destined never to be competitive. This would lead to successive currency devaluations that fail to achieve a stable equilibrium. The problem is therefore to determine whether the manufacturing operations carried out in the country will in time (for example in an estimated five to ten years) achieve a reasonably competitive level. This means considering the following questions:

What degree of local content should be reached?

In what order should locally made parts replace imported ones?

How fast should local content be introduced?

How should the local motor vehicle industry be organized? (It is evident that the structure resulting in the lowest product cost is that of maximum concentration of manufacturing so as to take full advantage of the effects of mass production. The Government must be able to control the monopolies thereby granted to the various enterprises manufacturing parts for, without this supervision, local monopoly entrepreneurs, accustomed to high profit rates, would be certain to take advantage of the situation.)

How can one co-operate with neighbouring countries on a regional basis, to make the most of the advantages of mass production through specialization in manufacture and liberalization of international trade?

A measure of dependence on foreign countries is unavoidable when establishing a motor vehicle industry. Financial dependence may arise from borrowing the capital required for investment, either from international banks or from those in other countries. Alternatively, the international vehicle manufacturer selling CKD kits or granting the licences may have shares in the local enterprise.

Technical dependence arises from the necessity of faithfully following the instructions and designs of the international manufacturer and accepting his quality control on a permanent basis.

Once the Government has weighed all the arguments for and against, it must take the basic decisions and prepare appropriate legislation and a carefully thought out plan to avoid mistakes, wastage and fraud to the greatest extent possible.

FORECASTS OF DEMAND AND PRODUCTION IN DEVELOPING COUNTRIES IN 1980

Methodology

In order to establish with reasonable accuracy what the situation of the motor vehicle industry in the developing countries might be during the Second Development Decade, a forecast "without surprises" will be made for these countries, in the meaning given to this phrase by Herman Kahn and Anthony J. Wiener in Chapter III of their book, *The Year 2000*⁷. They assume, in effect, that present trends will continue without calamities such as war, geological catastrophes, serious epidemics, or widespread economic depressions, from 1970 to 1980 and beyond. This study makes the further assumption that the current objections raised against the internal combustion engine as a source of atmospheric pollution and the eventual development of a modified or replacement motor with lesser environmental impact will not exert any great effect on vehicle demand in the developing countries.

Demand

Economists of the developed countries have thoroughly studied the place of the motor vehicle industry among the consumer goods industries, and the correlations between the number of motor vehicles in use, the population size, the economic situation and its evolution. They have arrived at complicated formulae which can be applied to a given country only if there is detailed information on the national accounts in the preceding ten years and, in particular, on household incomes. In most developing countries, however, this information is lacking and it is impossible to apply such methods.

The basic principle of the projections made in this chapter must be the empirical fact that the density of motor vehicle use in each country can be seen as a function of the *per capita* GNP.

⁷ *The Year 2000*, Hudson Institute Inc., 1967. Published in French translation as *L'an 2000*, Editeur Robert Laffont, Paris, 1968.

Nevertheless, a thorough study of the market in a given country should obviously be carried out by the most advanced methods, with all the necessary statistical information, wherever this is available.

It was pointed out in chapter 1 that the relationship between the number of cars per thousand inhabitants and *per capita* GNP for various geographical areas was nearly linear. A similar observation was made in 1960 by Hondermarcq, Director-General of Bridges and Roads in the Belgian Ministry of Public Works,⁸ though in terms of the logarithms of these two functions. Projections by Nowicki, of the International Bank for Reconstruction and Development, were based on the same assumption.⁹

If each set of projections is confined to the countries in a geographical area, natural rather than logarithmic functions may be used, owing to the fairly small differences in *per capita* GNP.

Similarly, in the case of PSV, projections may be made for the countries in each geographical area on the assumption of a linear relationship between the number of PSV per thousand inhabitants and *per capita* GNP.

For CV, the best correlation is between the growth in the number of vehicles and the growth in the GNP of the country concerned. This is logical, since goods transport activity is more or less proportional in a given economy to the over-all activity, which is reflected by the GNP.

The method of forecasting new registrations of vehicles will therefore consist, for each of the countries concerned, in the following steps:

- (a) Making a forecast of population growth to 1980;
- (b) Estimating the growth in GNP during the same period;
- (c) Deriving from these the *per capita* GNP for 1980;
- (d) Recording, for each geographical area, the number of motor vehicles in use in every country at a recent date (usually 1968), and deriving from this the linear relationship of car and PSV densities to *per capita* GNP;
- (e) Deriving from these densities the probable densities in 1980 and hence the probable number of cars and PSV in use in that year;
- (f) Deriving the probable number of CV in use in 1980 from the number in use in 1968 and the expected growth in GNP between 1968 and 1980;
- (g) Deducing the total of new registrations during the eleven years 1969 to 1979 on the assumption that in 1980 cars will have an average life of twelve years and CV and PSV an average life of sixteen years;
- (h) Calculating the level of new registrations in 1980 by assuming that new registrations increase at the compound rate of 10 per cent a year from 1969 to 1980.

See annex for further details and statistics connected with the forecasts.

Studies carried out in various developed countries lead to the assumption of an average life of twelve years for private cars and of sixteen years for other

⁸ "Le Programme routier belge", in the review *Transports*, Paris, July—August 1960.

⁹ A. G. Nowicki, "Automobile demand in developing countries", in the proceedings of the Karlovy Vary seminar, op. cit.

vehicles when used in these countries. The vehicles now circulating in the developing countries are a heritage of a sometimes very troubled past. Vehicles of various origins, often poorly suited to their present uses, in a deplorable state of repair and sometimes even very antiquated, are to be found in those countries. There are no statistics for the age pyramid such as are available in most developed countries, and it is impossible to form a reliable estimate of this pyramid, but the average life of vehicles is substantially longer than in developed countries.

The operating cost of a pool of antiquated vehicles of assorted types is much higher than that of a normally constituted pool of vehicles, for many reasons:

Breakdowns reduce the utilization factor, in particular for CV, and this means that an excessively large number of vehicles are employed;

Maintenance costs are much higher;

Consumption of fuel and lubricants is much higher;

Spare parts are often unavailable because international manufacturers do not supply them for more than fifteen years after series production of a given model has been discontinued. This makes it necessary either to manufacture parts on the spot using makeshift materials and equipment – which usually results in parts of a very much lower quality than the minimum required, although the price may be high – or to procure parts by cannibalization, in other words by stripping parts from scrapped vehicles, a course which also provides no guarantee of long life.

It should be an aim of policy in developing countries to bring this situation to an end within a reasonable period.

The method used to calculate new registrations assumes that by 1980 all such antiquated vehicles will no longer be in circulation (see annex) and that the utilization of vehicles will have been placed on a thoroughly economic basis.

The assumption of an annual growth of 10 per cent in new registrations is desirable for many reasons, which are also explained in the annex. Some assumption of this sort is necessary to proceed from the projection of the total number of new registrations in 1969–1979 to a number of new registrations in 1980.

The developing countries are grouped in the following geographical areas:

- Area 1: The Caribbean and Latin America – omitting Cuba, Canal Zone of Panama, Puerto Rico and certain Caribbean islands;
- Area 2: South-East Asia – excluding Brunei and Macao;
- Area 3: The rest of Asia with the exception of the Middle East;
- Area 4: North Africa and the Middle East – including the Arab countries (except Kuwait and the Republic of Yemen) and Cyprus, Israel and Turkey;
- Area 5: Africa south of the Sahara – but no estimates are made for Namibia and Southern Rhodesia;
- Area 6: Oceania – but no estimates are made for Guam.

Two alternative sets of forecasts for motor vehicles in use and new registrations in 1980 are presented. Alternative A is based on the assumption of a continuation of recent trends in GNP throughout the decade. Alternative B starts from the assumption that each developing country will achieve an annual rate of growth of GNP of 6 per cent during this decade, except that the forecast in alternative A is retained where it assumes GNP growth at more than 6 per cent.

In a paper as general as this, it is impossible to subdivide the CV forecasts according to the various groups of vehicles. There are different factors to be considered in individual groups as varied as:

- Small delivery vans (less than 1.6 tons carrying capacity);
- Short-haul vehicles (carrying capacity between 1.5 and 3 tons);
- Long-distance transport vehicles (vans and platform lorries);
- Tipper lorries and tankers;
- Road tractors and articulated vehicles.

A study in this detail would have to be carried out country by country. It would be necessary to take into account the position, geography and degree of urbanization and industrialization of the country; the competition from other means of transport (rail, sea, air and pipelines); and also the nature of goods transported, the location of production centres and the marketing policies of large enterprises.

Production

Having forecast new vehicle registrations in each country in 1980, largely by the use of statistical techniques, the next step is to consider to what extent they may be met from domestic manufacturing operations. The argument now becomes more complex, since political considerations intrude on economic ones at several levels.

New registrations are equal to domestic production minus exports, plus imports, which may include second-hand vehicles. Production itself can have varying degrees of domestic content, as already explained. All combinations are theoretically possible, from the import of complete vehicles to complete domestic manufacture.

This is a political matter in which considerations of employment policy are combined with considerations of financial and foreign policy. Hence, the best solution for a given country at a given juncture in its historical development is an individual matter, to be decided after thorough study, in co-operation with local experts and the Government itself.

This study must be carried out to ensure that production will be economically reasonable, i.e. that the cost of a vehicle leaving the factory will not be too different from the world price. The study must therefore take into account the volume of production anticipated in each vehicle category and the number of different models to be manufactured, while seeking to standardize as far as possible vehicles, units (engines, transmissions, axles, etc.) and accessories (generators, starters, batteries, carburettors, etc.).

In chapter 4, we shall study the considerations which determine the best vehicle manufacturing strategy. At this point, the countries can be divided into four categories, according to the following rule of thumb:

Complete domestic production is regarded as feasible in countries where total demand exceeds 100,000 cars and 50,000 CV a year;

Assembly of SKD or CKD vehicles can be envisaged in countries where the annual demand for cars is in the range 10,000 to 100,000 and that for CV in the range 5,000 to 50,000;

When demand reaches a certain level in these ranges, which depends on the specific situation in each country, the incorporation of domestically manufactured products can be introduced;

Import of complete vehicles is preferable where annual demand is less than about 10,000 for cars and 5,000 for CV.

Co-operation among countries in the same region makes it possible in some cases to adopt a more advanced course than that which economic isolation would lead to, either through a judicious distribution of the models to be manufactured, or by specialization in the production of units or accessories.

Review of the state of the motor vehicle industry in individual countries and forecasts according to alternative A

AREA 1: THE CARIBBEAN AND LATIN AMERICA

State of the motor vehicle industry

Motor vehicle industries exist in sixteen countries, six in the Caribbean and Central America and ten in South America.

Argentina left the assembly stage between 1962 and 1964 and now has completely domestic manufacture.

Production in 1969 amounted to 156,000 cars and 60,000 CV and PSV, compared with 132,000 cars and 48,000 CV and PSV in 1968. This production, comprising fifteen models of cars and twenty CV models, was carried out by eleven enterprises and the seven principal ones accounted for 93 per cent of the total. Six enterprises have closed their doors during the past six years.

Brazil has had completely domestic manufacture since 1964. In 1969, production amounted to 348,000 vehicles, including 240,000 cars and 108,000 CV and PSV. Eleven enterprises manufacture vehicles in the country, with four accounting for 96 per cent of production.

In *Chile*, fifteen enterprises, mostly engaged in assembly operations, delivered 24,591 vehicles in 1970—20,684 cars and 3,907 CV and PSV—representing an increase of over 47 per cent on the production level obtaining in 1967.

The law prescribes that 50 per cent of the parts of cars and 25 per cent of those of CV must be of local origin.

With the exception of Ford, which has been located at Santiago since 1920, the assembly plants are in the duty-free zone of Arica, where they enjoy special customs advantages.

In *Colombia*, the governmental decree regulating the development of the motor vehicle industry was published in December 1967.

There are currently five plants engaging in assembly of CKD vehicles.

In *Costa Rica*, assembly operations began in 1966. Nine enterprises assemble approximately 3,000 CKD vehicles a year, including cars and CV.

In *Mexico*, domestic manufacturers produced 164,000 vehicles in 1969, including 113,000 cars and 51,000 CV and PSV; this represents an increase of 10.4 per cent over 1968.

The number of firms authorized to operate under the decree of 25 August 1962 has been reduced in the last seven years. More than twenty have been eliminated, leaving ten in operation, of which four account for 70 per cent of total production. By 1966, all operating enterprises had achieved the prescribed 60 per cent of local incorporation in terms of "direct cost".

In *Peru*, the decree of January 1964 specifies conditions for the establishment of assembly plants. The proportion of locally manufactured parts must amount to 30 per cent at the end of the fifth year of operation.

Sixteen international manufacturers are assembling their vehicles in twelve enterprises. In 1969, 12,600 cars and 4,300 CV were assembled.

As regards *Venezuela*, the decree of 8 December 1965 provided that in vehicle-assembly plants the proportion of locally manufactured parts must amount to 60 per cent by weight by 1970. The import of complete vehicles has been prohibited since 1963 (with the exception of some special CV).

In 1967, 41,795 cars (including 24,329 American cars) and 16,074 station wagons and CV were assembled in fourteen enterprises for sixteen manufacturers. In 1969, output reached 53,600 cars and 24,800 CV.

Some other Central and South American countries are engaged in assembly on a fairly small scale:

- Bolivia:* One plant assembles thirty cars a month;
- Ecuador:* Several shops holding assembly licences operate intermittently;
- Guatemala:* One plant has been assembling diesel lorries and bus chassis since 1966. There are plans for another plant to assemble cars and farm tractors;
- Paraguay:* One plant has been assembling cars at the rate of fifteen a month in Asunción since March 1967;
- Dominican Republic:* One plant assembles fifteen cars a month;
- El Salvador:* Lorries and buses are assembled at Santa Ana, at the rate of 200 a year;
- Trinidad:* Since 1967, cars and lorries have been assembled in three plants. Output is 3,000 a year;

Uruguay: Several small assembly plants assemble cars and CV, often with rudimentary equipment.

Examination of the situation forecast for 1980

If we now refer to table 4, giving forecast new registrations in 1980, we can classify the countries concerned according to the four categories of manufacture listed on page 18.

TABLE 4. FORECAST A OF MOTOR VEHICLES IN USE AND NEW REGISTRATIONS IN DEVELOPING COUNTRIES

AREA 1: THE CARIBBEAN AND LATIN AMERICA
(Thousand units)

	Motor vehicles in use		Forecast new registrations in 1980			
	1 Jan. 1969	Forecast 1 Jan. 1980	Cars	CV	PSV	Total
<i>The Caribbean and Central America*</i>						
Costa Rica	48.9	84.9	8.9	1.4	0.5	10.8
Dominican Republic	57.1	99.4	8.7	2.7	0.4	11.7
El Salvador	53.3	91.9	9.4	0.9	0.6	10.9
Guatemala	63.8	123.1	10.9	4.0	0.6	15.5
Haiti	8.5	10.6	1.3	0.3	— ^b	1.6
Honduras	29.6	52.3	3.5	2.1	0.4	6.0
Jamaica	80.5	134.1	14.1	3.8	— ^b	17.9
Mexico	1,447.4	2,820.8	250.4	107.0	10.1	367.5
Nicaragua	31.4	60.4	5.2	2.0	0.3	7.4
Panama	49.7	122.2	12.9	2.6	0.6	16.2
Trinidad and Tobago	89.9	174.9	18.7	3.5	— ^b	22.2
Sub-total	1,960.0	3,774.7	343.9	130.4	13.4	487.7
<i>South America</i>						
Argentina	1,931.0	2,601.9	219.4	102.0	4.0	325.4
Bolivia	48.3	75.2	5.8	3.4	0.3	9.5
Brazil	2,858.8	4,250.9	314.2	178.8	14.8	507.9
Chile	228.2	438.1	34.6	21.8	2.3	58.7
Colombia	264.3	482.1	39.6	19.8	4.2	63.6
Ecuador	58.5	96.0	5.7	4.6	0.7	11.0
Paraguay	25.6	34.1	2.5	0.6	0.5	3.6
Peru	324.0	633.3	51.8	26.9	2.9	81.6
Uruguay	210.7	280.3	23.1	16.6	0.7	40.4
Venezuela	654.1	1,128.8	111.5	30.3	2.3	144.0
Sub-total	6,603.6	10,020.7	808.3	404.8	32.7	1,245.8
Total	8,563.6	13,795.4	1,152.2	535.2	46.0	1,733.5

* Mexico is included here with Central America.

^b PSV included with CV.

Mexico and Venezuela, both of which began to develop their motor vehicle industries during the First Development Decade, may be expected to join Argentina and Brazil in achieving complete domestic production. These countries are capable of adapting their industries to domestic demand and even of exporting to the rest of the area. Their problems during the Second Development Decade are likely to be the following:

- (a) To reduce unit costs, which are too high for many reasons, but above all because they produce too many models of vehicles in relation to the size of the market;
- (b) To develop their engineering development and testing services, and their methods engineering, so as to eliminate dependence on foreign technical assistance in producing vehicles thoroughly suited to the local climate and requirements;
- (c) To expand the scope of their general mechanical workshops and the manufacture of stamping tools, so that all the tools needed for production can be made domestically;
- (d) To improve the quality of accessories and equipment, which are all too often the subject of complaints by vehicle operators;
- (e) To concentrate production in a smaller number of enterprises by the merger of companies in financial difficulties.

These four countries should be able to assist the Latin American countries in the remaining three categories by supplying them with CKD sets, equipment and accessories, production tools and advice.

The countries in which assembly operations are likely to prove feasible, with or without incorporation of domestically manufactured products, are Guatemala, Jamaica, Panama, Trinidad, Chile, Colombia, Peru and Uruguay for cars; and Chile, Colombia, Peru and Uruguay, Venezuela for CV. Car assembly can be put on a firmer footing in the Dominican Republic and perhaps started in El Salvador, since the demand is expected to approach 10,000 vehicles by the end of the decade in both countries. Similarly, Ecuador and Guatemala may be in a position to start assembling commercial vehicles.

Negotiations have been under way since 1967 between Chile, Colombia, Ecuador, Peru and Venezuela to establish a joint production programme. Their combined new registrations in 1980 are forecast at 260,000 cars, 111,000 CV and 13,000 PSV. An effort to standardize vehicles, particularly CV, to reduce the number of manufacturers and to standardize accessories and equipment for a market of this size, coupled with an equitable distribution of production among the five partners, would undoubtedly make it possible to produce vehicles in well equipped factories at a cost level that allowed exports to the rest of the area. It may prove difficult, however, to reach an agreement in view of the established positions in the five countries of forty-six local-assembly enterprises and twenty-six international manufacturers, not to mention the manufacturers of accessories, equipment and parts.

In all the remaining countries, import of complete vehicles will remain preferable, unless they can agree to joint operation of production units sufficiently large to justify vehicle assembly.

AREAS 2 AND 3: ASIA, EXCLUDING THE MIDDLE EAST

State of the motor vehicle industry

Seven of the nine individually shown countries in area 2—South-East Asia—have assembly plants, namely, Burma, Indonesia, the Khmer Republic, Malaysia, the Philippines, Singapore and Thailand.

In *Burma*, vehicles of Japanese origin are assembled in two plants. Production in 1968 was 142 cars and 1,274 CV.

Six *Indonesian* companies assemble cars and CV.

In the *Khmer Republic*, assembly of medium-weight and heavy lorries is carried out by one plant. Output was 120 vehicles in 1967 and 400 in 1968. Domestic manufacture on an increasing scale is scheduled to follow simple assembly.

Seven plants are being built in *Malaysia* to assemble eighty-seven models of vehicles, although the total combined market of Malaysia and Singapore is currently only 33,000 vehicles a year. There are six assembly plants in *Singapore*, either operating or being installed.

The situation is complicated in the *Philippines* by the proliferation of models (100), manufacturers (20) and assembly plants (40), in a market of 22,000 vehicles a year. Total production in 1969 amounted to 20,100 vehicles (13,200 cars and station wagons and 6,900 CV and PSV). Many assembly plants with low output are in financial difficulties and the Government is planning measures to eliminate the marginal enterprises.

Thailand has seven assembly plants, with no local content and a total annual production capacity of 17,000 vehicles.

Of the eight individually shown countries in area 3, four have motor-vehicle assembly industries—Ceylon, Iran, Pakistan and the Republic of Korea—and one, India, has totally integrated vehicle manufacture.

Ceylon has had an assembly plant for cars since 1968 with a production capacity of 1,800 a year, three-quarters of which are intended for export. Projects for chassis and bus-assembly plants are under study.

Production in *India* increased from 31,000 vehicles in 1956 to 80,300 in 1969 (of which 35,700 were cars). Domestic content amounts to between 76 per cent and 94 per cent (in value), according to the vehicle model. From 1972, manufacture is to be 100 per cent domestic.

At the beginning of 1968, production capacity amounted to 40,000 cars, 12,000 jeeps and 58,500 CV (total of 110,500 vehicles). This was distributed among nine enterprises, four of which accounted for 80 per cent of the total. Production capacity in 1972 is to be 50,000 cars, 25,000 jeeps and 90,000 CV (a total of 165,000 vehicles).

Assembly of cars, CV and PSV in *Iran* is carried out by eight plants. Production in 1969 was approximately 21,600 cars and 3,900 CV and PSV.

In the *Republic of Korea* three enterprises have been engaged in assembly since 1966. Local content amounts to about 30 per cent. Output in 1969 amounted to 19,400 cars and 13,000 CV and PSV.

Pakistan has five plants, three of which assemble cars. Annual production capacity is approximately 6,000 cars and 8,000 industrial CV.

Examination of the situation forecast for 1980

The forecast new registrations in 1980 are shown in table 5. On the basis of these projections, the various countries can be classified according to the four categories of manufacture listed above.

TABLE 5. FORECAST A OF MOTOR VEHICLES IN USE AND NEW REGISTRATIONS IN DEVELOPING COUNTRIES

AREA 2: SOUTH-EAST ASIA

AREA 3: THE REST OF ASIA, EXCLUDING THE MIDDLE EAST

(Thousand units)

	Motor vehicles in use		Forecast new registrations in 1980			
	1 Jan. 1969	Forecast 1 Jan. 1980	Cars	CV	PSV	Total
<i>Area 2</i>						
Burma	64.4	101.8	7.4	4.1	1.4	12.8
Indonesia	298.6	391.5	33.1	15.7	3.7	52.6
Khmer Republic	38.8	62.1	5.7	1.7	— ^a	7.4
Laos	14.0	19.9	1.8	0.5	— ^a	2.3
Malaysia	269.1	519.7	57.0	11.3	1.3	69.5
Philippines	352.3	627.2	42.8	27.7	6.4	77.0
Singapore	156.1	241.5	25.7	5.9	0.5	32.1
Thailand	252.4	544.2	37.7	23.5	3.8	65.0
Viet-Nam, Rep. of	91.5	205.4	16.5	7.6	— ^a	24.2
Sub-total	1,537.3	2,713.3	227.8	97.9	17.1	342.9
<i>Area 3</i>						
Afghanistan	18.4	45.3	4.0	1.7	0.3	6.1
Ceylon	124.2	194.8	16.9	12.1	1.5	30.4
Hong Kong	88.0	185.2	19.6	4.2	0.8	24.6
India	882.0	1,511.1	117.6	60.3	13.6	191.4
Iran	261.6	490.1	47.3	10.7	2.5	60.5
Korea, Rep. of	57.8	203.9	17.3	8.9	— ^a	26.2
Nepal	5.2	14.3	1.6	0.2	— ^a	1.9
Pakistan	235.7	509.5	50.0	6.9	4.2	61.1
Sub-total	1,672.9	3,154.2	274.3	105.0	22.9	402.2
Total	3,210.2	5,867.5	502.1	202.9	40.0	745.1

^a Included under CV.

India would remain the only country in areas 2 and 3 where complete manufacture is justified for both cars and CV. The domestic content of Indian vehicles is already up to 90 per cent by value and 100 per cent is planned for 1972. There should be no major difficulties in meeting all requirements by the expansion of existing plants, after increased rationalization.

The countries in which assembly operations are likely to prove feasible, with or without incorporation of domestically manufactured products, are the following:

For cars: Indonesia, Malaysia, the Philippines, Singapore, Thailand, and the Republic of Viet-Nam in area 2; and Ceylon, Hong Kong, Iran, the Republic of Korea, Pakistan in area 3;

For CV: Indonesia, Malaysia, the Philippines, Singapore, Thailand, the Republic of Viet-Nam in area 2; and Ceylon, Iran, the Republic of Korea, Pakistan in area 3.

The assembly of commercial vehicles can be placed on a firmer footing in Burma and perhaps started in Hong Kong, since a demand of over 4,000 CV is forecast for 1980 in both countries.

All these countries, with the exception of Hong Kong and the Republic of Viet-Nam, already have assembly plants. In many cases, assembly operations are uneconomic as there are too many plants in relation to the national demand and they assemble too many different models. An attempt should be made to reduce the number of plants in order to reduce unit costs and improve product quality.

In the remaining countries, namely, Afghanistan, the Khmer Republic, Laos and Nepal, import of complete vehicles will remain preferable.

AREA 4: NORTH AFRICA AND THE MIDDLE EAST

State of the motor vehicle industry

Of the six countries in the North African sub-area, four have a motor vehicle industry, namely, Algeria, Egypt, Morocco and Tunisia.

More than 11,000 vehicles (7,400 cars, 2,700 light vans and 1,200 heavy lorries) were assembled in *Algeria* in 1968 in two plants.

Two State-owned plants assemble vehicles in *Egypt*. Output, especially that of cars, fluctuates annually in response to changes in the Egyptian economy. In 1969 the output was 2,300 cars and 1,850 CV and PSV.

In *Morocco*, assembly is carried out in five plants. In 1969, more than 18,000 cars and 11,000 CV were assembled. Production in 1970 is expected to attain a local content of 35 per cent. The State holds 40 to 45 per cent of the equity in these plants.

Société tunisienne d'industrie automobile (STIA), in which the Government of *Tunisia* holds 60 per cent of the capital, has established an assembly plant at Sousse (6,000 m²), which assembled nearly 1,000 vehicles in 1967.

Of the countries in the Middle East sub-area, two, namely, Israel and Turkey, carry out assembly operations.

In *Israel* four enterprises assembled 11,000 vehicles in 1969 (4,800 cars and 6,200 CV and PSV).

There are thirteen assembly plants in *Turkey*. The domestically manufactured content is 45 per cent. Production for 1967 was estimated at 15,500 vehicles (excluding farm tractors).

Examination of the situation forecast for 1980

We can classify the countries in the area according to the four categories of manufacture listed above, on the basis of the forecast new registrations presented in table 6.

TABLE 6. FORECAST A OF MOTOR VEHICLES IN USE AND NEW REGISTRATIONS IN DEVELOPING COUNTRIES

AREA 4: NORTH AFRICA AND THE MIDDLE EAST (Thousand units)

	Motor vehicles in use		Forecast new registrations in 1980			
	1 Jan. 1969	Forecast 1 Jan. 1980	Cars	CV	PSV	Total
<i>North Africa</i>						
Algeria	188.6	270.1	20.7	16.6	— ^a	37.4
Egypt	144.5	455.6	54.1	7.7	— ^a	61.9
Libya	112.6	190.2	17.0	4.5	0.2	21.7
Morocco	264.6	359.0	34.1	11.7	— ^a	45.8
Sudan	53.5	100.5	7.8	4.3	0.4	12.7
Tunisia	86.6	175.3	14.6	9.9	0.3	24.8
Sub-total	850.4	1,550.6	148.6	54.9	0.8	204.3
<i>Middle East</i>						
Cyprus	58.1	70.4	6.4	1.7	— ^a	8.1
Iraq	104.5	300.5	29.7	6.1	1.6	37.7
Israel	167.4	619.8	63.1	17.1	1.1	81.8
Jordan	25.5	86.4	9.1	2.1	0.3	11.4
Lebanon	139.7	215.3	24.9	2.7	0.4	28.0
Saudi Arabia	145.2	325.4	28.9	8.3	0.6	37.8
Syria	47.3	112.1	11.4	3.7	— ^a	15.1
Turkey	225.2	593.6	61.1	16.9	4.0	82.1
Yemen, People's Dem. Republic of	22.9	45.8	4.9	0.8	— ^a	5.7
Sub-total	935.9	2,369.2	239.6	60.2	8.0	307.8
Total	1,786.3	3,919.8	388.1	115.1	8.8	512.1

^a Included under CV.

None of the countries in this area meets the conditions laid down for complete domestic production. Assembly operations, however, are likely to prove feasible, with or without incorporation of domestically manufactured products, as follows:

For cars: Every country shown, except Cyprus, Jordan and the People's Democratic Republic of the Yemen;

For CV: Every country shown, except Cyprus, Lebanon, Libya, Jordan, Syria and the People's Democratic Republic of the Yemen.

Among the exceptions just noted, by 1980 Jordan may perhaps embark on car assembly, since an annual demand of over 9,000 cars is anticipated, while Libya may supplement its potential car-assembly operations by including CV, since the annual demand for these vehicles is expected to be about 4,500.

A regional agreement, either in North Africa or in the Middle East, to integrate markets and produce a few standardized models, in plants allocated equitably among the countries concerned, would make feasible the complete manufacture of cars and CV.

In Israel and Turkey the forecast demand would permit a large degree of incorporation of standardized, domestically manufactured parts, accessories and equipment.

AREA 5: AFRICA SOUTH OF THE SAHARA¹⁰

State of the motor vehicle industry

There are motor vehicle industries in twelve countries, namely, Angola, Cameroon, Dahomey, Ethiopia, Ghana, Guinea, the Ivory Coast, Kenya, Madagascar, Mozambique, Nigeria and Senegal.

The situation may be summarized as follows:

Angola: There has been one assembly plant in operation since the first half of 1968, and another is being built on the outskirts of Luanda.

Cameroon: One plant has been assembling cars and CV at Douala since July 1967.

Dahomey: A plant to assemble cars and CV at the rate of 100 vehicles a month was erected at Cotonou in 1966. Output has been about 50 a month.

Ethiopia: An assembly plant is planned for an annual output of 1,000 CV.

Ghana: 4,000 CV of various makes are assembled annually by seven local enterprises. A plant is being built to assemble cars.

¹⁰ No estimates are made for Namibia and Southern Rhodesia.

Guinea: One plant (51 per cent government-owned) was established at Conakry in 1964 to assemble 2,000 vehicles a year (including 750 lorries, 750 light vans or cars and 500 jeeps). A second plant is planned at Conakry for the assembly of 600 cars and 600 CV a year.

The Ivory Coast: A plant at Abidjan has been assembling cars and CV since 1962. Some of these vehicles are exported to the Upper Volta and the Niger under special customs agreements. Another assembly plant is planned for cars and CV of various European makes.

Kenya: One plant assembles about 1,000 Land Rovers a year. A second plant is planned for the production of 50 to 60 cars and light CV a month.

Madagascar: Two assembly plants have been in operation since 1962. The two plants employ a total of 220 workers and produce about 1,500 cars and CV a year.

Mozambique: Two CV assembly plants are planned.

Nigeria: In 1967, production amounted to 6,700 vehicles (cars and CV), carried out by eight assembly plants. An additional plant is planned, with an annual capacity of 6,000 to 8,000 cars.

Senegal: Two plants have been assembling CV at Thiès and Dakar since 1963. Total production in 1967 was 238 vehicles.

Examination of the situation forecast for 1980

The forecast new registrations are shown in table 7. The classification of the various countries in the area according to categories of manufacture is as follows.

No country in this area has a forecast demand for cars or CV that would warrant complete domestic production. If, despite the diversity of races, languages, customs and political systems, it proves possible to negotiate the establishment of one or two vehicle production units supplying subregional groups of countries, it would be possible to envisage complete domestic production. The large distances involved and limited transport facilities available, however, would pose distribution problems.

Assembly operations, with or without incorporation of domestically manufactured products, are likely to be feasible for cars in Ghana, Kenya and Nigeria. All three countries already have assembly operations and these can be put on a firmer footing. Car assembly can perhaps be envisaged in Ethiopia, Mozambique, Zambia and Zaire, while the Ivory Coast and Madagascar can increase their existing assembly operations substantially as all of them can expect an annual demand for cars in the range of 9,000—10,000 by the end of the decade.

Assembly of commercial vehicles is likely to prove feasible in Ghana, Mozambique, Nigeria and Tanzania. In addition to these four countries, Angola, Cameroon, the Ivory Coast, Madagascar and Senegal may find it possible by 1980 to step up their existing assembly operations considerably, while Zaire may embark on CV assembly, since the forecast annual demand in each of these countries is in the region of 4,000 vehicles.

TABLE 7. FORECAST A OF MOTOR VEHICLES IN USE AND NEW REGISTRATIONS IN DEVELOPING COUNTRIES

AREA 5: AFRICA SOUTH OF THE SAHARA
(Thousand units)

	Motor vehicles in use		Forecast new registrations in 1980			
	1 Jan. 1969	Forecast 1 Jan. 1980	Cars	CV	PST	Total
<i>Central Africa</i>						
Angola	71.3	95.6	5.0	3.8	— ^a	8.8
Cameroon	47.7	71.1	4.5	4.3	0.5	9.3
Central African Republic ..	13.9	18.4	1.0	0.9	— ^a	1.9
Chad	9.9	16.9	1.1	0.8	— ^a	2.0
Congo	13.1	16.6	1.2	0.9	— ^a	2.2
Gabon	12.8	15.3	1.2	0.5	— ^a	1.7
Zaire	72.4	112.1	9.8	3.8	0.2	13.9
Sub-total	241.0	346.0	24.0	15.1	0.7	39.8
<i>Eastern Africa</i>						
Botswana	5.0	8.6	0.6	0.5	— ^a	1.2
Burundi	4.5	8.2	0.8	0.2	— ^a	1.0
Ethiopia	45.6	90.3	9.2	1.4	0.5	11.1
Kenya	106.2	142.7	15.9	1.6	0.4	17.9
Madagascar	72.2	103.5	8.0	4.8	0.2	13.0
Malawi	15.3	22.1	1.9	0.9	— ^a	2.8
Mauritius	15.4	24.3	2.7	0.7	— ^a	3.4
Mozambique	75.4	131.7	9.8	6.1	0.2	16.1
Reunion	22.9	34.0	2.8	1.5	— ^a	4.3
Rwanda	4.4	6.9	0.5	0.2	— ^a	0.7
Somalia	5.7	8.4	0.8	0.2	— ^a	1.0
Swaziland	9.9	11.4	0.9	0.4	— ^a	1.2
Tanzania, United Rep. of..	65.8	105.1	6.7	5.1	0.5	12.2
Uganda	46.5	66.4	7.4	0.6	— ^a	8.0
Zambia	63.1	90.6	9.4	1.5	0.3	11.3
Sub-total	558.0	854.2	77.6	25.6	2.0	105.2
<i>West Africa</i>						
Dahomey	16.0	22.0	1.6	1.0	— ^a	2.6
Gambia	4.0	6.1	0.4	0.3	— ^a	0.7
Ghana	50.5	112.2	10.4	5.2	— ^a	15.6
Guinea	22.9	39.7	3.5	2.5	— ^a	6.0
Ivory Coast	70.8	102.7	8.2	3.8	0.2	12.2
Liberia	19.7	21.4	2.2	0.2	0.1	2.6
Mali	11.2	20.2	1.6	1.1	— ^a	2.6
Mauritania	4.5	7.1	0.4	0.5	— ^a	0.9
Niger	8.4	11.7	1.4	0.3	— ^a	1.8
Nigeria	133.6	293.9	29.5	6.5	1.1	37.1
Senegal	52.5	76.0	6.3	3.4	0.3	10.1
Sierra Leone	26.7	33.5	2.8	1.0	— ^a	3.7
Togo	1.5	4.2	0.5	0.3	— ^a	0.8
Upper Volta	10.3	16.8	1.2	0.7	— ^a	2.0
Sub-total	432.4	767.4	70.2	26.8	1.7	98.7
Total	1,231.4	1,967.6	171.8	67.5	4.4	243.7

^a Included under CV.

Many countries already have assembly plants which cannot be justified on purely economic grounds at their current output levels. Even for the demand forecast in 1980, assembly operations are likely to remain marginal for many of them unless efforts are made to limit the number of plants and the range of models assembled.

It follows that the import of complete cars and CV is preferable in the great majority of the countries shown in table 7.

AREA 6: OCEANIA

State of the motor vehicle industry

The developing countries in this area consist of the numerous islands that are scattered over the Pacific Ocean, excluding the Philippines (see area 3) and Hawaii (part of the United States).

None of these countries has a motor vehicle industry.

Examination of the situation forecast for 1980

Table 8 below contains forecasts of motor vehicles in use and new registrations, on the same lines as those made for the other areas, and completes the forecast of demand in the developing countries.

TABLE 8. FORECAST A OF MOTOR VEHICLES IN USE AND NEW REGISTRATIONS IN DEVELOPING COUNTRIES

AREA 6: OCEANIA (Thousand units)

	Motor vehicles in use		Forecast new registrations in 1980		
	1 Jan. 1969	Forecast 1 Jan. 1980	Cars	CV and PSV	Total
Fiji Islands	12.4	22.2	2.2	0.7	2.9
New Caledonia	18.8	28.4	2.5	0.7	3.2
New Guinea	22.3	35.5	2.6	1.2	3.8
French Polynesia	14.2	25.3	2.5	0.8	3.2
Total	67.7	111.4	9.8	3.3	13.1

The small numbers involved do not warrant the establishment of a motor vehicle industry, even based on assembly of SKD kits, in any of the developing countries in this area. Indeed, it would scarcely be justified for the area as a whole.

Summary of forecasts (alternative A) by area

The data shown in tables 4 to 8 are summarized by area in table 9 below.

TABLE 9. MOTOR VEHICLES IN USE AND NEW REGISTRATIONS: SUMMARY BY AREA
(Thousand units)

	Motor vehicles in use		Forecast new registrations in 1980			
	1 Jan. 1969	Forecast 1. Jan. 1980	Cars	CV*	PSV*	Total
The Caribbean and Latin America	8,563.6	13,795.4	1,152.2	535.2	46.0	1,733.5
Asia (areas 2 and 3)	3,210.2	5,867.5	502.1	202.9	40.0	745.1
North Africa and Middle East	1,786.3	3,919.8	388.1	115.1	8.8	512.1
Africa south of the Sahara	1,231.4	1,967.6	171.8	67.5	4.4	243.7
Oceania	67.7	111.4	9.8	3.3	— ^a	13.1
Total	14,859.2	25,661.7	2,224.0	924.0	99.2	3,247.7

* Included with CV.

We have considered the situation of 93 developing countries. Table 10 below analyses these countries in each area according to the volume of new registrations foreseen in 1980. It also shows how many countries in each area already have a motor vehicle industry (assembly or production).

TABLE 10. AREA ANALYSIS OF MOTOR VEHICLE INDUSTRIES AND FORECAST OF NEW REGISTRATIONS
(ALTERNATIVE A)

Area	No. of countries	No. of existing motor vehicle industries	Forecast new registrations in 1980 (thousand units)	No. of countries in which total forecast registrations will be:					
				More than 200,000	100,000 to 200,000	20,000 to 100,000	10,000 to 20,000	5,000 to 10,000	Less than 5,000
1	21	16	1,733.5	3	1	5	7	3	2
2	9	7	342.9	0	0	6	1	1	1
3	8	5	402.2	0	1	5	0	1	1
4	15	6	512.1	0	0	10	3	2	0
5	36	12	243.7	0	0	1	10	4	21
6	4	0	13.1	0	0	0	0	0	4
Total	93	46	3,247.5	3	2	27	21	11	29

There are motor vehicle industries in 46 developing countries, the great majority consisting of assembly operations. According to the broad criteria adopted in this chapter, the size of the national market is large enough in 27 of these countries to justify economically the existence of the industry; in a further 7 countries (4 Latin American and 3 African) it is forecast that the growth of the national market would justify the operations by 1980; while in the remaining 12 countries (5 African, 5 Latin American and 2 Asian) it does not appear that operations would be justified even by 1980.

On the other hand, the demand forecasts suggest that by 1980 the following 15 countries may envisage establishing car-assembly plants using SKD or CKD kits: Jamaica and Panama in area 1; Hong Kong in area 2; the Republic of Viet-Nam in area 3; Iraq, Jordan, Lebanon, Libya, Saudi Arabia, the Sudan and Syria in area 4; Ethiopia, Mozambique, Zaire and Zambia in area 5. In a few of these countries CV may also be economical to assemble.

It must be repeated that a detailed study of the situation is necessary in each country before taking any decisions. Furthermore, no allowance has been made for the possibility of any group of countries rationalizing production on the basis of integrating their markets. In fact, we have come close to assuming that, once demand reaches 10,000 cars or 5,000 CV a year, a local industry will be established and no complete vehicles will be imported or exported. Before closing the discussion about the production forecasts it is desirable to take a closer look at this matter.

International trade in motor vehicles

The very progress of the developing countries leads to a fluid situation, as between trade in complete vehicles and trade in SKD and CKD kits for assembly. At best, we may hope to ascertain trends rather than make quantitative forecasts.

One should begin by describing the general picture in the relatively few industrialized countries where the majority of the world's motor vehicles are produced, as it is expected to develop in the period 1970—1980.

New plants are being built in the United States, Europe and Japan to expand production. Substantial investments are planned for modernization of production plant (automation). Concentration and mergers of enterprises may become even more frequent, increasing the number of vehicles produced by each surviving enterprise and reducing the number of models. The use of computers will become increasingly widespread in research, development, production, management and marketing.

Other things being equal, these trends will result in a reduction in cost prices and a considerable improvement in quality (reliability and durability), associated with the increase in the volume of annual production. Competition among the major international manufacturers will become increasingly intense, particularly in those export markets which become more widely open as a consequence of trade liberalization at the world level.

Opportunities for the developing countries to export motor vehicles, which are already small, will shrink further, except within regional common markets having high external tariffs for motor vehicles or where special trade agreements apply to a group of countries. Apart from facing severer competition from exports by developed countries, in terms of the selling prices of comparable models, the developing countries will not easily attain the same product quality, particularly as regards accessories. Furthermore, the organization of sales and after-sales services abroad (including the requisite credit facilities) is a task of considerable magnitude and many developing countries would have difficulty in finding

the human and material sources needed for this purpose. For these reasons, the fact that, when contracts are renewed, the major international manufacturers will probably not retain the currently prevailing clause barring competition in third markets will make virtually no difference to exports from developing countries. The striking success of Japan in export markets is due to special conditions which appear unlikely to be repeated elsewhere. It should not lead developing countries which are establishing motor vehicle industries to indulge in rosy dreams.

Many developing countries with a motor vehicle industry, even an assembly industry, will almost inevitably suffer from cost prices so high in comparison with those of the developed countries that they will be forced to raise customs barriers in future, rather than lower them, to safeguard their own vehicle industries. In other words, these developing countries will be under pressure to act counter to the world policy of trade liberalization, increasing the protection they grant to their domestic industries.

For them, imports will be limited to highly specialized CV models required in such limited numbers that even assembly of SKD kits would not be justified. Caterpillar tractors, bulldozers, and heavy road tractors are cases in point.

Our conclusion must be that in general the establishment of a motor vehicle industry in a developing country virtually eliminates trade in motor vehicles between that country and other countries, except for transactions with the major international manufacturers who are co-operating to set up the industry. In other words, new registrations and domestic production become almost identical in volume.

The effect on forecast demand and production in 1980 of assuming 6 per cent minimum annual growth in the GNP of the developing countries (alternative B)

Throughout this chapter we have adopted the modest assumption that in the decade from 1970 to 1980 each country would achieve an annual growth in its GNP equal to that achieved in a recent period for which statistics are in almost all cases available. (The average GNP in 1950—1952 was compared with the average in 1964—1966.) This resulted in a forecast average annual growth of 5 per cent for all developing countries taken together.

Among the goals and objectives of the Second United Nations Development Decade, adopted by the General Assembly as part of the International Development Strategy for the Decade,¹¹ is an average annual rate of growth in the gross product of the developing countries as a whole of at least 6 per cent, with the possibility of attaining a higher rate in the second half of the Decade to be specified on the basis of a comprehensive mid-term review.

In this section we analyse briefly the effect which this goal of a higher growth rate may have on the picture already presented of potential vehicle

¹¹ General Assembly resolution 2626 (XXV).

demand, new registrations and production in 1980. For this purpose, we assume that each individual developing country will achieve an average annual rate of growth of 6 per cent in its GNP over the period studied, except that the forecasts already made in this chapter will be retained for those countries for which an annual growth of GNP in excess of 6 per cent was adopted. This will, of course, result in an average annual rate of growth of GNP slightly greater than 6 per cent for the developing countries as a whole.

Tables 11 to 15 show the forecast number of motor vehicles in use and the new registrations in 1980 according to alternative B, area by area, in similar detail to tables 4 to 8.

TABLE 11. FORECAST B OF MOTOR VEHICLES IN USE AND NEW REGISTRATIONS IN 1980

AREA 1: THE CARIBBEAN AND LATIN AMERICA

(Thousand units)

	Total motor vehicles in use	Forecast new registrations			
		Cars	CV ^a	PSV ^b	Total
<i>The Caribbean and Central America^a</i>					
Costa Rica	92.5	9.6	1.7	0.5	11.8
Dominican Rep.	140.0	8.7	2.7	0.4	11.7
El Salvador	91.9	9.4	0.9	0.6	10.9
Guatemala	140.0	13.0	4.2	0.6	17.8
Haiti	24.8	3.2	0.4	— ^b	3.6
Honduras	67.0	4.8	2.8	0.4	8.1
Jamaica	157.0	16.7	4.4	— ^b	21.1
Mexico	2,820.8	250.4	107.0	10.1	367.5
Nicaragua	62.1	5.3	2.1	0.3	7.7
Panama	122.2	12.9	2.6	0.6	16.2
Trinidad and Tobago	174.9	18.7	3.5	— ^b	22.2
Sub-total	3,852.7	352.7	132.3	13.5	498.5
<i>South America</i>					
Argentina	3,775.8	325.9	155.7	7.0	488.6
Bolivia	94.4	7.5	4.3	0.4	12.2
Brazil	4,717.8	349.2	207.0	16.6	572.8
Chile	525.7	42.3	25.8	2.8	70.9
Colombia	591.1	50.4	23.5	4.8	78.7
Ecuador	118.7	7.6	5.7	0.8	14.1
Paraguay	49.4	4.0	1.2	0.6	5.7
Peru	633.3	51.8	26.9	2.9	81.7
Uruguay	425.8	35.5	24.0	1.1	60.7
Venezuela	1,194.2	144.4	38.4	3.2	186.1
Sub-total	12,126.1	1,018.7	512.7	40.0	1,571.4
Total	15,978.9	1,371.4	645.0	53.5	2,069.9

^a Mexico is included here with Central America.

^b Included under CV.

TABLE 12. FORECAST B OF MOTOR VEHICLES IN USE AND NEW REGISTRATIONS IN 1980

AREA 2: SOUTH-EAST ASIA

AREA 3: THE REST OF ASIA, EXCLUDING THE MIDDLE EAST
(Thousand units)

	Total motor vehicles in use	Forecast new registrations			
		Cars	CV ^a	PSV ^a	Total
<i>Area 2</i>					
Burma	139.8	10.8	5.6	1.6	18.1
Indonesia	671.7	61.2	25.0	5.4	91.5
Khmer Republic	69.4	6.5	1.9	— ^a	8.4
Laos	22.1	1.9	0.6	— ^a	2.5
Malaysia	521.6	57.2	11.3	1.3	69.8
Philippines	389.2	56.8	35.3	7.4	99.5
Singapore	249.5	26.4	6.3	0.5	33.2
Thailand	544.2	37.7	23.5	3.8	65.0
Viet-Nam, Rep. of	217.0	17.8	8.2	— ^a	25.8
Sub-total	3,224.6	276.1	117.7	20.1	413.9
<i>Area 3</i>					
Afghanistan	59.3	5.5	2.1	0.4	8.0
Ceylon	236.7	20.0	14.6	1.7	36.3
Hong Kong	185.2	19.6	4.2	0.8	24.6
India	2,111.7	180.5	77.9	16.5	274.9
Iran	490.1	47.3	10.7	2.5	60.5
Korea, Rep. of	203.9	17.3	8.9	— ^a	26.2
Nepal	22.1	2.7	0.3	— ^a	3.0
Pakistan	577.3	58.3	7.7	4.2	70.2
Sub-total	3,886.3	351.2	126.4	26.1	503.7
Total	7,110.9	627.3	244.1	46.2	917.6

^a Included under CV.

Table 16 presents for each area the forecasts of motor vehicles in use and new registrations in 1980 according to the two alternatives. The assumption of a minimum 6 per cent annual growth rate in GNP (alternative B) leads to a 1980 estimate of 30.7 million motor vehicles in use in the developing countries under consideration, which is 18.3 per cent more than the forecast according to alternative A. The total new registrations forecast for 1980 rise by 21 per cent to alternative A. The total new registrations showing a proportionate increase from 3.3 million to approximately 4 million, in passing from alternative A to alternative B, with new car registrations showing a proportionate increase from 2.2 million to 2.7 million and new registrations of CV and PSV rising by about 20 per cent from 1.0 million to slightly over 1.2 million.

TABLE 13. FORECAST B OF MOTOR VEHICLES IN USE AND NEW REGISTRATIONS IN 1980

AREA 4: NORTH AFRICA AND THE MIDDLE EAST
(Thousand units)

	Total motor vehicles in use	Forecast new registrations			
		Cars	CV ^a	PSV ^a	Total
<i>North Africa</i>					
Algeria	413.1	34.2	23.1	— ^a	57.3
Egypt	455.6	54.1	7.7	— ^a	61.9
Libya	231.9	22.0	5.4	0.2	27.5
Morocco.....	512.0	48.2	17.5	— ^a	65.7
Sudan	130.0	10.8	5.4	0.6	16.8
Tunisia	184.1	15.4	10.3	0.2	25.9
Sub-total	1,926.6	184.7	69.3	1.0	255.1
<i>Middle East</i>					
Cyprus	87.4	7.7	2.8	— ^a	10.5
Iraq	300.5	29.7	6.4	1.6	37.7
Israel	619.8	63.1	17.7	1.1	81.8
Jordan.....	86.4	9.1	2.1	0.3	11.4
Lebanon	232.2	26.9	3.1	0.4	30.3
Saudi Arabia	325.4	28.9	8.3	0.6	37.8
Syria	112.1	11.4	3.7	— ^a	15.1
Turkey	919.0	101.8	21.1	4.4	127.3
Yemen, People's Dem. Rep. of ...	45.8	4.9	0.8	— ^a	5.7
Sub-total	2,728.4	283.5	65.9	8.4	357.7
Total	4,655.0	468.2	135.2	9.4	612.8

^a Included under CV.

Note: The original forecasts have been retained for Egypt, Iraq, Israel, Jordan, Saudi Arabia, Syria and the People's Democratic Republic of Yemen, all of which have an annual growth rate of GNP in excess of 6 per cent on the preceding hypothesis.

A comparison by area of the alternative forecasts of motor vehicles in use in 1980 reveals that the widest disparities between them occur in Africa south of the Sahara and in Oceania, for both of which alternative B is nearly 28 per cent higher than alternative A. This may be readily understood, because the extrapolation of past trends results in an annual growth rate of GNP much below 6 per cent for the great majority of the countries included in these two areas. For areas 2 and 3 and for area 4 the totals forecast according to alternative B are 20.3 per cent and 18.7 per cent, respectively, greater than those according to alternative A, while for Latin America the increase is 15.8 per cent. As may be anticipated from the methodology of the forecasts, a comparison of the new registrations forecast for 1980 according to the two alternatives shows similar percentage differences to those in respect of motor vehicles in use.

TABLE 14. FORECAST B OF MOTOR VEHICLES IN USE AND NEW REGISTRATIONS IN 1980

AREA 5: AFRICA SOUTH OF THE SAHARA

(Thousand units)

	Total motor vehicles in use	Forecast new registrations			
		Cars	CV*	PSV*	Total
<i>Central Africa</i>					
Angola	134.1	7.2	7.0	— ^a	14.2
Cameroon	101.2	7.2	5.7	0.6	13.5
Central African Rep.	26.5	1.5	1.5	— ^a	3.0
Chad	24.6	1.6	1.4	— ^a	3.0
Congo	22.3	1.6	1.4	— ^a	2.9
Gabon	27.1	2.4	0.9	— ^a	3.4
Zaire	161.5	15.1	5.2	0.5	20.7
Sub-total	497.2	36.7	23.0	1.1	60.8
<i>Eastern Africa</i>					
Botswana	9.9	0.7	0.6	— ^a	1.3
Burundi	12.0	1.2	0.3	— ^a	1.5
Ethiopia	113.8	12.0	1.8	0.6	14.4
Kenya	184.0	20.1	3.0	0.6	23.6
Madagascar	131.9	10.2	6.5	0.3	16.9
Malawi	34.3	3.0	1.5	— ^a	4.5
Mauritius	28.3	3.1	0.9	— ^a	3.9
Mozambique	147.8	11.1	7.3	0.2	18.7
Reunion	41.8	3.6	1.8	— ^a	5.4
Rwanda	9.4	0.8	0.3	— ^a	1.1
Somalia	12.1	1.2	0.3	— ^a	1.5
Swaziland	12.5	0.9	0.5	— ^a	1.4
Tanzania, United Rep. of	127.8	8.4	6.4	0.6	15.4
Uganda	79.8	9.0	0.8	— ^a	9.9
Zambia	90.6	9.4	1.5	0.3	11.3
Sub-total	1,035.9	94.8	33.1	2.6	130.7
<i>West Africa</i>					
Dahomey	27.0	2.0	1.3	— ^a	3.3
Gambia	7.7	0.5	0.5	— ^a	0.9
Ghana	150.9	14.7	6.3	— ^a	21.0
Guinea	49.0	4.4	2.8	0.1	7.3
Ivory Coast	129.3	10.3	5.4	0.3	15.9
Liberia	29.6	3.0	0.5	0.2	3.7
Mali	31.4	2.7	1.3	0.1	4.2
Mauritania	13.1	1.0	0.7	— ^a	1.8
Niger	17.7	2.1	0.5	— ^a	2.6
Nigeria	327.5	33.6	6.9	1.3	41.8
Senegal	100.2	8.6	4.5	0.4	13.4
Sierra Leone	42.7	3.5	1.5	— ^a	5.0
Togo	7.9	1.0	0.3	— ^a	1.3
Upper Volta	24.1	1.9	1.1	— ^a	3.0
Sub-total	958.1	89.3	33.6	2.3	125.3
Total Area 5	2,491.2	220.8	90.0	6.1	316.8

* Included under CV.

Note: The original forecasts have been retained for Zambia, which has an annual GNP growth rate in excess of 6 per cent on the preceding hypothesis.

TABLE 15. FORECAST B OF MOTOR VEHICLES IN USE AND NEW REGISTRATIONS IN 1980

AREA 6: OCEANIA
(Thousand units)

	Total motor vehicles in use	Forecast new registrations		
		Cars	CV and PSI ^a	Total
Fiji Islands	29.8	3.1	0.9	4.0
New Caledonia	36.6	3.2	1.1	4.3
New Guinea	47.4	3.8	1.7	5.5
French Polynesia	28.5	2.8	0.9	3.7
Total	142.3	12.8	4.6	17.4

TABLE 16. COMPARISON OF ALTERNATIVE FORECASTS FOR MOTOR VEHICLES IN USE AND NEW REGISTRATIONS IN 1980, BY AREA
(Thousand units)

		Total of motor vehicles in use, 1 Jan. 1980	Forecast new registrations in 1980			
			Cars	CV	PSI ^a	Total
Area 1	Alternative A	13,795.4	1,152.2	535.2	46.0	1,733.5
	Alternative B	15,978.9	1,371.4	645.0	53.5	2,069.9
Areas 2 and 3	Alternative A	5,867.5	502.1	202.9	40.0	745.1
	Alternative B	7,110.9	627.3	244.1	46.2	917.6
Area 4	Alternative A	3,919.8	388.1	115.1	8.8	512.1
	Alternative B	4,655.0	468.2	135.2	9.4	512.8
Area 5	Alternative A	1,967.6	171.8	67.5	4.4	243.7
	Alternative B	2,491.2	220.8	90.0	6.1	316.8
Area 6	Alternative A	111.4	9.8	3.3	— ^a	13.1
	Alternative B	142.3	12.8	4.6	— ^a	17.4
Total	Alternative A	25,661.7	2,224.0	924.0	99.2	3,247.5
	Alternative B	30,378.3	2,700.5	1,118.9	115.2	3,834.5

^a Included under CV.

Compared with the picture of the possibilities for complete domestic production of cars already presented on the basis of forecast A for new registrations, forecast B leads to no radical alteration. In area 4 Turkey, with an annual car demand in 1980 of just beyond the 100,000 mark, may join the handful of countries where such production is justified, while Argentina, Brazil and Venezuela in area 1 and India in area 3 will face a significantly higher demand and can expand their domestic production correspondingly. Similar considerations apply to the complete domestic production of CV, with the exception of Venezuela, where their production will still be marginal with demand expected to be around 40,000 vehicles a year by 1980, and Turkey where the expected demand will remain too low to justify such an operation. In addition, the Philippines,

in area 2, will be approaching demand levels at which complete domestic production of CV may be economically viable, the 1980 demand forecasts for this category of vehicles totalling over 35,000 on the second hypothesis.

As for assembly operations, with or without the incorporation of domestically manufactured products, the following observations can be made regarding the different geographical zones.

Of the eight countries in Latin America in which assembly operations were considered feasible on our criteria according to forecast A, all except Trinidad and Peru would be able to increase their level of production according to forecast B, while the assembly of CV and PSV may also become more interesting for a further two among them, namely Jamaica and Guatemala, since both would then expect an annual demand in the 4,000 to 5,000 range. The higher number of new car registrations in forecast B (9,600) would make car-assembly operations a more economic proposition than previously in Costa Rica; the assembly of CV and PSV might become viable in Ecuador and very nearly so in Bolivia, the expected demand being 5,700 and 4,300, respectively, in 1980.

In Asia, the higher volume of registrations according to forecast B would also permit higher production levels and, in this context, special mention may be made of the substantially higher new CV registrations in both Indonesia and the Philippines—25,000 and 35,000 respectively. Perhaps the most significant change arising out of the higher growth hypothesis is that Burma might join the ranks of the countries where the assembly of both cars and commercial vehicles is economically justified.

In North Africa and the Middle East, the complete manufacture of cars and CV on a sub-regional basis either in North Africa or in the Middle East becomes slightly more attractive according to forecast B; no significant change is noted in the position of individual countries, except that the assembly of CV may prove economically feasible in both Libya and the Sudan.

As for the rest of Africa, forecast B's much higher volume of new registrations would render car assembly an economic proposition in Ethiopia, Madagascar, Mozambique, the Ivory Coast and Zaire. The assembly of CV might be economically viable in all of these countries, with the exception of Ethiopia, as well as in some other countries, namely Angola, Cameroon and the United Republic of Tanzania. Further, car assembly might hold some interest for Senegal, the United Republic of Tanzania and Uganda while Senegal might also be in a position to make its existing CV-assembly operations more economic.

The prospects for the countries in area 6 embarking on any assembly operations are not much enhanced by the 33 per cent increase in total new registrations forecast for 1980 by assuming a higher GNP growth rate.

CRITICAL REVIEW OF THE ESTABLISHMENT OF MOTOR VEHICLE INDUSTRIES SINCE 1950

General considerations

In chapter 1, we noted that the developing countries, with a population of 1,663 million, or 61 per cent of the population of the countries included in table 1, had 15.1 million vehicles in use, or 7 per cent of the total for those countries and only 9.1 vehicles per thousand inhabitants. Their production in 1969 of 1.1 million vehicles (including assembly operations) represented only 3.8 per cent of world production. Annual production in developing countries averaged only 7.3 per cent of the number of vehicles in use in those countries compared with an average of 13.7 per cent for all the countries included in tables 1 and 2.

In chapter 2 forecasts were made on two alternative bases of the number of cars, CV and PSV in use and of the annual level of new registrations at the end of the Second United Nations Development Decade. From these we inferred what policy it would probably be desirable for each of the 94 developing countries examined to follow with regard to motor vehicle manufacturing. It was emphasized, however, that the general nature of this study did not permit clear-cut solutions to be advocated and that in every country a detailed investigation was first required.

Since 1950, nearly 50 of these developing countries have begun motor vehicle production operations, with varying amounts of assistance from manufacturers in the more developed countries, as part of their industrial development.

In this chapter, an attempt will be made to analyse the reasons behind the individual cases of relative success or semi-failure. The argument will be illustrated in places by examples drawn from the experience of countries that set up motor vehicle industries in fairly recent times but are not treated here as developing countries (Australia, Japan, Spain and so forth). The record of these countries contains mistakes as well as successes. It is hoped, in this way, to offer practical advice to those in developing countries who may be concerned with setting up or developing an existing motor vehicle industry or with rectifying a situation which has become unsatisfactory as a result of past errors on the part of the manufacturers and/or the Government.

The criticisms made and their causes

The criticisms which tend to be made, either of methods or equipment, come from four different quarters and the causes of the complaints are the responsibility of one or more of the same parties, namely:

Governments and Government agencies (GA);

The international motor vehicle manufacturers that grant licences and supply CKD or SKD kits (IM);

Domestic manufacturers (DM); and

Customers (Government and private) (CU).

Criticisms may be classified into three categories: economic, technical and administrative. The following schedule lists the criticisms in each category according to originating quarter, showing the causes of complaint and the parties responsible.

<i>Criticism</i>	<i>Originating quarter</i>	<i>Causes of complaint</i>	<i>Party responsible</i>
<i>I. Economic criticisms</i>			
Selling prices too high	CU	Costs too high	DM
		Domestic taxes too high	GA
		Location of plants	DM
		Dealer commissions too high	GA
		Too many sales outlets	DM
Costs too high	GA	Production volume too low	GA
		Incompetence of management	DM
		Too many models	GA
		Too many DMs	GA
		Too many IMs	GA
		High cost of accessories	GA
		Capital investments too large	DM
		Manufacturing methods unsuited to length of production run	DM
		Premature incorporation of domestic products	GA
		Unwarranted incorporation of domestic products	GA
Customs duties too high	GA		

<i>Criticism</i>	<i>Originating quarter</i>	<i>Causes of complaint</i>	<i>Party responsible</i>
DM unable to export	GA	Costs too high	DM
		Lack of intergovernmental co-operation	GA
		Contract with IM prohibits exports	IM
Spare parts too expensive	CU	Costs too high	DM
		Dealer commissions too high	GA
		Domestic taxes too high	GA
		Poor service organization	DM
Component parts too expensive	IM	Ignorance of management practice of IM	DM
		Mistrust	DM
Licence fees too high	IM	Ignorance of expenses incurred by IM	DM
		Mistrust	DM
		Exaggerated demand by IM	IM
Shortage of foreign exchange	DM	Economic and political situation	GA
Instability of currency	IM	Economic and political situation	GA
Production volume too low	IM	Insufficient survey of market	DM
		Lack of discrimination in choice of models	DM
		Purchasing power of customers too low	GA
		DM unable to export	GA
		Too many models	GA
DM experiencing financial difficulties		Consequence of high costs and low production volume	DM
		Inadequacy of initial capitalization	DM
		Inadequacy of preliminary studies	DM
		Poor management	DM
		Inadequate capital market	GA

<i>Criticism</i>	<i>Originating quarter</i>	<i>Causes of complaint</i>	<i>Party responsible</i>
<i>II. Technical criticisms</i>			
Quality inferior to that of imported vehicles	CU	Too many models dissipate efforts	GA
		Poor quality of raw materials	GA
		Poor quality of labour	GA
		Poor quality of supervisory staff	GA
		Inadequate means of production	DM
		Too rapid incorporation of domestic products	GA
		Inadequate quality control	DM
Frequent breakdowns	CU	Same causes as for inferior quality (see above)	
		Lack of customer education	CU
		Unsuitability of vehicle	DM
		Inadequate maintenance	DM
		Mediocre repair work	DM
		Mediocre road system	GA
Vehicle life too short	CU	Same causes as for frequent breakdowns (see above)	
Mediocre quality of accessories	CU	Same causes as for inferior quality (see above)	
		Lack of standardization	GA
Faulty maintenance and repair	CU	Lack of service stations	DM
		Stations poorly equipped	DM
		Incompetent labour	DM
		Lack of instructions and repair manuals in the language of the country	DM
Vehicles unsuited to climate, terrain, quality of roads or fuel	CU	Poor choice of vehicle	DM
		Cubic capacity of motor inadequate	DM
		Insufficiently robust chassis	DM
		Lack of collaboration between IM and DM	IM

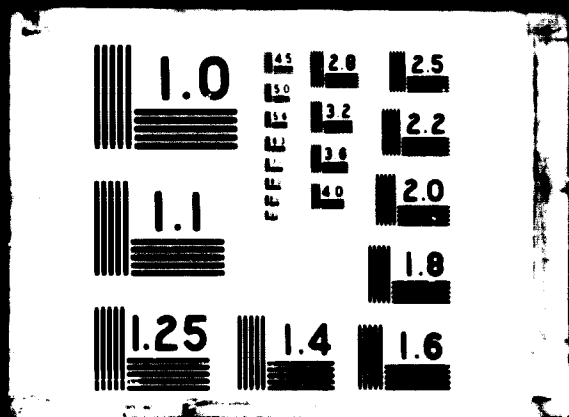
<i>Criticism</i>	<i>Originating quarter</i>	<i>Causes of complaint</i>	<i>Party responsible</i>
Insufficient technical assistance from licensor	DM	Insufficient skilled staff at licensor and DM	IM
		Difficulties due to language barrier	
		Mistrust	IM
Incompetence of management and labour	IM	Inadequacy of vocational and technical training	GA DM
		Lack of industrial experience	GA
<i>III. Administrative criticisms</i>			
Time allowed for incorporation of domestic products too long	GA	Hasty and incompetent policies	GA
		Incompetence and lack of comprehension on the part of Government officials	GA
		Lack of confidence by public authorities	GA
Time allowed for incorporation of domestic products too short	IM	Lack of the necessary domestic industries	GA
		Inadequacy of the licensor's technical facilities	IM
		Inadequacy of technical facilities of the DM	DM
		Slowness of Governments	GA
		Vagueness and instability of Government regulations	GA
Instability of Governments	IM	Political situation	GA
Vagueness of government regulations	IM	Incompetence of officials	GA
Constantly changing regulations	IM	Incompetence of officials	GA
		Consequence of vagueness of regulations	GA
Lack of co-ordination among the various ministries concerned	IM and DM	Organization of Government agencies	GA



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2 OF 2

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<i>Criticism</i>	<i>Originating quarter</i>	<i>Causes of complaint</i>	<i>Party responsible</i>
Uncomprehending and slow customs authorities	IM and DM	Consequence of vague and constantly changing regulations and lack of co-ordination among ministries	GA
Inconsistencies in economic policy (prices, credit, inflation)	IM	Domestic and foreign political situation	GA

Conclusions to be drawn from analysis of the causes of criticism

Some fundamental conclusions may be drawn from this analysis to form the basis for the discussion in chapter 4 of this study.

The role of Government agencies

In economic, technical and administrative matters alike, government agencies have an essential role to play in establishing a motor vehicle industry in a developing country. They need to take action in the following areas:

Orientation at the outset, specifying goals and time limits;

Advice in the choice of manufacturers and models, in order to limit their numbers;

Protection of the new industry from massive imports of complete vehicles through an appropriate fiscal policy and inducements to "buy national" by manipulating credit and trade policy;

Supervision of the execution of contracts;

Arbitration in the event of difficulties between the domestic manufacturer and the foreign manufacturer licensing the operation and supplying the CKD kits;

Organizing schools and universities in the public sector to train the managers and the indispensable technical staff and skilled labour.

In many countries, these tasks have been assigned to special bodies in order to ensure that they are handled by competent officials and that the actions taken by the various Government agencies concerned are co-ordinated. Examples of these are:

The *Grupo executivo para la industria automobilistica* (GEIA), in Brazil;

The *Comisión para el fomento de la industria automotriz*, in Chile;

The *Instituto de fomento industrial*, in Colombia;

The *Grupo programador de la industria automotriz*, in Venezuela.

In other countries, the State participates in the capital of the vehicle manufacturing companies through a State agency, nominates one or more Directors and thereby carries out supervision from within. The experience of Spain shows that such a situation need not preclude the establishment of a vigorous, rapidly expanding industry. The Spanish Government indirectly holds 74.9 per cent of the capital of one of the main enterprises, ENASA. Production in Spain rose from 16,000 in 1955 to 454,471 vehicles in 1969, of which ENASA and two other companies accounted for 77 per cent.

There is state capital participation, for example, in the following developing countries:

Guinea, where the State owns 51 per cent of the capital of SOMOVA;

Senegal, where the State owns 10 per cent of the capital of Berliet-Senegal through the Banque sénégalaise de développement;

Algeria, where the State owns 40 per cent of the capital of Berliet-Algérie;

Morocco, where the State has a 40 per cent participation in Berliet-Maroc and 40 per cent in SOMACA, through the Bureau d'études et de participation industrielle (BEPI);

Tunisia, where the State has a 60 per cent participation in STIA.

In yet other countries, the plants are State-owned and the role of foreign motor vehicle manufacturers is limited to supplying licences or CKD kits. This is the case in all the centrally planned economies of Eastern Europe, Egypt, Cambodia and Yugoslavia.

Concentration of production

A small number of models and a small number of enterprises are essential features if the vehicles and accessories produced are to be of high quality and competitive price.

The Government should impose this situation from the outset as a matter of policy if it wishes to avoid a proliferation of small assembly shops carrying out SKD or CKD assembly of dozens of models of cars and CV, such as can be found in Malaysia, the Philippines, Singapore and elsewhere.

It may be thought advantageous to attract many international manufacturers initially, in the expectation that competition will bring about concentration of assembly operations in the course of a few years. The experience of Portugal shows that this may fail to happen. Legislative decrees in 1961 and 1962 prescribed assembly of CKD kits, prohibiting the import of finished vehicles and requiring the incorporation of domestic products to reach 25 per cent by 1 January 1969. There are still 18 enterprises assembling the models of 30 American and European manufacturers. Output in 1969 was 51,700 cars and 15,400 CV and PSV.

The incorporation of domestically manufactured products

Domestic products should not be introduced hastily, for otherwise product quality may be lowered and costs increased excessively. The time schedule for this process and the proportion of "domestic content" to be achieved must

take into account not only the financial resources of the country and of vehicle manufacturing enterprises, but also the number of managers, technical staff and skilled workers locally available. The growth of "domestic content" nearly always takes place to the detriment of the cost price of the vehicles and the Government must determine to what extent it can accommodate the consequent increase in selling prices in its financial policy (high domestic prices, impossibility of exporting, hence balance of payments deficit) without paving the way to monetary inflation. Some observers are of the opinion that the pace of inflation in Argentina and Brazil between 1955 and 1965 was due in no small measure to a policy that required the incorporation of domestic parts too rapidly.

A very thorough and precise study should be made in each case. The following factors need to be considered:

The distance between the plants of the manufacturer supplying the SKD or CKD kits and the assembly plant;

The costs of preparing matched sets of parts for CKD (and to a lesser extent SKD) kits, packing, freight and insurance;

The daily rate of vehicle assembly planned;

The working life of equipment, which determines the depreciation charges for tooling;

The wage rates for production labour;

The quality of supervisory staff and production labour.

Governments tend, in order to economize foreign exchange, to force up the percentages by value of the "domestic content" and to reduce the time limits for achieving them. They should in no case impose compliance with figures that they have determined *a priori*.

An approach adopted by Australia appears to be worthy of adoption more widely. Since April 1965, the regulations provide an option, allowing the manufacturer to choose between two plans. Under plan A (domestic manufacturer status), he undertakes to achieve a "domestic content" of 95 per cent within five years, except for models with an annual production of less than 7,500, in which case the proportion ranges between 45 per cent and 60 per cent. Under plan SV (assembler status), no particular level of "domestic content" is obligatory, but customs duties on imported items are much higher than under plan A.

It is for each manufacturer to choose in the light of his market, his financial and industrial resources and the cost price of the model.

As a result, of a total of 390,119 vehicles despatched from Australian plants in 1967, 346,000 (including 298,000 cars) were manufactured under plan A, and 44,000 under plan SV. Of the five enterprises with domestic manufacturer status, namely GM- Holden, Ford, Chrysler, British Leyland Motors and International, the first four also apply plan SV in the case of certain models. Three American, four Japanese and four European enterprises have assembler status.

The Japanese firms consider plan SV most advantageous and even go so far as to diversify their activities and change models to avoid exceeding the figure of 7,500 in a year. Volkswagen Australia, which had invested \$A28 million

over three years in order to achieve the 95 per cent level prescribed by plan A, decided to abandon this course and return to plan SV with a local content of 50 per cent, after showing losses of \$A3.75 million in 1966 and \$A2.5 million in 1967.

The Republic of South Africa followed a similar, but slightly less flexible, course. Since 1964, any firm wishing to operate there has had to choose between the following:

Assembler status, under which the Government limits the firm's imports through a system of quotas per model, making any development of sales beyond those of the reference year virtually impossible; and

Manufacturer status, under which the enterprise undertook to achieve a minimum "domestic content", by weight, of 55 per cent by the end of 1969 and 70 per cent by the end of 1970. In this case, no quantitative restriction is applied to production and the manufacturer enjoys a refund of indirect taxes (excise duty).

In July 1968, 37 models produced in 14 plants by 15 manufacturers (4 American, 9 European and 2 Japanese) out of the 35 operating in the Republic of South Africa had received the "S.A. Manufactured" stamp. These 37 models (in 106 variants) accounted for 90 per cent of sales in 1968.

Most developing countries made regulations when they established motor vehicle industries, fixing the percentages of "domestic content" to be achieved by specific dates.

Brazil required 95 per cent by weight to be achieved in 1960 (Decree No. 39,412 of June 1956). This provision was met by all manufacturers, but at the expense of incurring an increase in costs whose adverse effects have not been overcome.

In Chile, the Decree of 19 March 1962 specified 50 per cent in the case of cars and station wagons, 25 per cent in the case of light vans, jeeps, etc.

In Argentina, the proportion is 94 per cent, and the maximum annual increase allowed in production volume is 5 per cent. For production of a new model the manufacturer is obliged to obtain a permit.

In Mexico, the *Diario oficial* published a Decree on 25 August 1962, laying down conditions for Mexicanization of the motor vehicle industry. It provided for 60 per cent "domestic content" in terms of direct cost by 31 December 1966. All the enterprises achieved this target. The number of firms authorized to operate has been reduced in seven years from thirty to ten. The Ministry of Industry fixes production and sales quotas every year for each enterprise.

In Peru, the moderate terms of the Decree of January 1964 should be pointed out. The "domestic content" must reach a minimum of 30 per cent by the end of the fifth year of production. However, further decrees in May and June 1967 provided for credit restriction measures and an increase in customs duties in order to encourage assemblers to purchase locally produced accessories and to manufacture more components.

In Venezuela, a statutory order on 8 December 1965 by the Ministry of Finance and the Ministry of Development, laid down that "domestic content" must reach 60 per cent by weight by 1 January 1970.

The Government of India has taken the strongest line in this matter, deciding that all collaboration with the foreign manufacturers involved in setting up existing enterprises must cease in 1972 both as to licensing agreements and the import of parts. It remains to be seen whether this decision can be applied when the time comes, unless many exceptions are made.

According to a Chilean study relating to a low-cost medium-sized car, it is possible to reach 27 per cent by value "domestic content" without embarking on manufacture of the really vital units. This figure would be made up as follows:

	<i>Per cent</i>
Wheels and tires	4.4
Windows	1.6
Brake operating systems.....	1.2
Upholstery	7.0
Raw material for paint	2.9
Radiator	1.9
Small mechanical parts (gear-shift lever, etc.)	3.4
Body accessories	4.6
Total	27.0

The study also showed, however, that the prices of components were much higher when manufactured in Chile than when produced by the original manufacturer and shipped to a Chilean port. To achieve 30 per cent "domestic content" would involve making components whose prices averaged 300 per cent of the prices (before payment of any duties) of the corresponding imported articles; to achieve 40 per cent "domestic content" raises the average to 500 per cent of import prices; and to achieve 50 per cent "domestic content" raises the average to 650 per cent.

There are many reasons why components of motor vehicles may cost so much more in a developing country than when manufactured in one of the major vehicle-producing countries. The most obvious one is the inability to use a low-cost high-volume technology when supplying a small market. High reject rates resulting from poor-quality materials may be another reason. The vehicle manufacturer may be forced to buy a certain component from the sole domestic manufacturer, even if he charges monopoly prices for an article of mediocre quality, simply in order to reach the percentage "domestic content" prescribed by Government regulations.

The shortage of technical staff and skilled labour

One of the major difficulties in the establishment and development of a motor vehicle industry, even at the assembly stage, is the shortage of skills.

The speed with which it proved possible to develop the Japanese and Spanish motor vehicle industries was due to the fact that there were engineers, workshop

superintendents, foremen, skilled labourers and mechanics on the spot, who simply changed the industry in which they worked, but were familiar with the disciplines of industrial production and were experienced in mechanical engineering.

It is indispensable that the international manufacturer should have sufficient confidence in the operation to send skilled staff to constitute the backbone of technical leadership in the new enterprise throughout the starting-up period (several years) and to train technical staff who are nationals of the developing country.

It is desirable that the foreign staff should know the language of the country, but not indispensable. Experience has shown that knowledge of English and French makes it possible to work effectively during the several months needed to learn the language spoken in the country.

Mutual trust between the foreign and domestic manufacturers

Although it cannot be measured and expressed in figures, the factor of mutual trust is also essential if constant friction is to be avoided between the foreign and domestic manufacturers collaborating in a given project. Intervention between the two parties by Government authorities if difficulties arise does not always occur at a well-chosen time and can only make relations worse. The distribution of responsibilities for financial, technical, administrative and commercial matters should be clearly specified before joint activities begin, so that each party is aware of the scope of his commitments and the areas in which he should make decisions. He can then take appropriate action in good time.

It is obvious that, for reasons of competence, the technical sphere should be reserved at the outset for the manufacturer who grants the licences and supplies SKD or CKD kits. He should be responsible for choosing local suppliers of accessories and for dealing with questions of quality. It is advisable that samples of accessories purchased locally, and even of parts manufactured by the domestic manufacturer himself, should be sent to the foreign manufacturer, so that his extensive technical facilities and experience may be used to check whether designs have been followed, as regards quality, materials used, dimensions and tolerances.

Similarly, for psychological reasons, administration, relations with public authorities, personnel questions, commercial management should be reserved for nationals responsible to the national general manager. Their knowledge of the laws, customs, habits, people and language will enable them to avoid or find the best solution for the many conflicts which arise inevitably in such enterprises, where the clash of interests may be exacerbated by national susceptibilities and sometimes even by racial feelings.

It is desirable that in each sphere the manager and the deputy manager should belong to different parties. On the technical side the deputy can be trained to assume responsibility somewhat later, while on the financial side the deputy can act as adviser in order to avoid errors arising from lack of knowledge or inexperience.

There must be a relationship of trust between individuals at all levels of the hierarchy, between the leaders of the two companies as well as between executives. This will not, *a priori*, be easy to achieve. The managers have an important role to play in establishing this atmosphere of trust and co-operation, above all by the force of personal example. Trust at the management level should go as far as the exchange of the most secret long-term projects. This will come about only if each party is certain, as a matter of personal conviction rather than what is written in contracts, that the other party does not intend even in the long term to cease collaborating and will not reveal to anyone—even government authorities—the confidential information imparted.

It is obviously easier to create such relations when the foreign manufacturer participates directly in the capital of the enterprise, especially when this enterprise is the majority shareholder and therefore appoints the chairman (or president) of the company and the managing director; but relations of this sort are desirable in any case.

Mutual trust between manufacturers and government authorities

The above remarks apply also to relations between those who direct the enterprise and the officials of ministries or special bodies set up to co-ordinate and supervise the application of regulations for the motor vehicle industry. Trust depends on reciprocal actions. The official must be sure of the complete sincerity of the industrialist and the strict accuracy of the information supplied to him. The industrialist must feel certain that the documents and information which he supplies will remain confidential and that no favouritism will be shown towards his competitors, even if they are State-owned businesses.

When, as is now increasingly frequent, the State holds equity in the enterprise, relations are facilitated, as mentioned above. In any event, officials—and even ministers—should strictly refrain from intervening in any way in the day-to-day management of the enterprise, for example, to recommend a supplier, a potential employee or an inventor, or to solicit a service. They should allow everyone to take full responsibility for his decisions in the context of existing regulations. When a Government imposes the production programme, as in Mexico, it takes responsibility by implication for marketing the output and, in the event of a slump, for all the social consequences (laying off staff, reduction of working hours) or financial repercussions (accumulation of stocks and shortage of cash) which may result.

“... there is no single strategy or universal prescription for development which is valid in all countries at all times; many combinations of policies and priorities are both possible and necessary.”¹²

¹² Report of the Commission on International Development set up under the chairmanship of L. B. Pearson by the International Bank for Reconstruction and Development: *Partners in Development*, Praeger, New York, 1969 (Annex I, p. 236).

ACTION PROGRAMME FOR THE MOTOR VEHICLE INDUSTRY IN DEVELOPING COUNTRIES

Introduction

The analysis given in chapter 3 makes it possible to draw lessons from the experience of the past 20 years, for countries with a motor vehicle industry which has made a poor start and those—few in number, as we have seen—which, during the Second Development Decade, could establish assembly plants or proceed from assembly of SKD or CKD kits to incorporation of a moderate number of domestic products.

In the first case, action should be taken to rectify the situation and re-establish normal operating conditions in the coming decade, from the points of view of both production cost and product quality. This is a difficult task. Enterprises have gained certain positions, sometimes they have been granted privileges. Mistakes have been made in assessing demand and the investment required. However, it is better to take decisions in good time than to wait until financial difficulties or bankruptcy make it necessary to close plants abruptly, with the resulting social consequences.

In the second case, experience gained elsewhere should make it possible to avoid gross errors, to shorten the period of hesitation in devising an action programme for the industry and to accelerate the starting-up phase of operations.

In both cases, preliminary studies must be carried out by competent experts who are as independent as possible of the three parties involved—the government authorities, international manufacturers and domestic manufacturers—in order to achieve the objectivity indispensable for formulating valid recommendations. The final say must obviously rest with the government authorities, who must answer for the political consequences of the decisions to be taken and who are best placed to judge their timeliness for the general development of the country.

It is essential to avoid hasty decisions based on considerations of personal or national prestige and to make sure that the programme fits well into the general economic development of the country, with a wise order of priorities and means suited to the goal.

It is fatal to try to tackle everything at once: automobiles, lorries, aircraft, machine tools, petroleum refineries, transistors, refrigerators . . . It is not easy

to restrict one's programme to what is possible when everything cries out to be done, including expansion of agricultural production to provide even the minimum food requirements of the population.

Improvement of existing motor vehicle industries

The industry stands in great need of improvement in many of the developing countries which now have assembly or production operations. The measures to be taken are discussed here under a number of heads.

Reduction of the number of models manufactured

All too often, the range of models manufactured is appropriate to the requirements of markets with much greater purchasing power than that of the country concerned, since the vehicles were designed for those markets. In reducing the number of models, the following considerations should be taken into account:

The suitability of vehicles to the market and to local traffic conditions (climate, terrain, state of tracks and roads);

The distribution of past sales, according to model, which provides some indication of customer acceptance. However, some reservations must be made, since different marketing action in the future can have substantial effects (prices, rebates, advertising, credit);

The quality of production, which depends on the type of production equipment used and the quality of the technical staff and the labour force;

The level of costs, which depends on the same factors as quality and on efficiency of management. The cost of the vehicle in the parent plant should also be borne in mind as a pointer to any abnormal situation in the local plant.

Taking into account these various considerations, the different models manufactured in the country can be classified according to an order of priority.

Reduction of the number of manufacturing companies

In studying the various manufacturing enterprises, with a view to reducing their number, it is necessary to investigate the following factors in the situation:

Medium- and long-term possibilities in the domestic and export markets;

The financial situation of each enterprise;

The technical and financial worth of production facilities in the various enterprises;

The competence of managements and technical staffs;

The ranges of models manufactured, classified according to the criteria described above;

The present and future production programme and the resulting investment plans of each enterprise;

- The degree of foreign participation in company capital;
- The actual cost levels achieved;
- The size and dynamism of their commercial organizations (number of sales outlets, efficiency of service workshops).

Concentration of vehicle production facilities

Apart from any reduction in the number of enterprises, a concentration of the means of production should be devised which eliminates assembly lines producing only a few vehicles a day or even a week. In many countries different makes and competing models are already assembled in a single plant. This practice should be generalized. The following factors need to be taken into account:

- The size of plants, the machine tools and other equipment (in particular, painting lines) installed in them;
- The quality of this equipment (particularly its age);
- The employment situation in the area in the context of the demographic prospects and economic development;
- The skill of the local labour force and the facilities for retraining labour available in the relevant areas. Skilled handworkers or labourers who have worked in other industries are easier to retrain for operations in the motor vehicle industry than, for example, agricultural workers;
- Communications facilities for labour, raw materials and accessories;
- Facilities for the supply of power, water and gas;
- The wage level of local labour;
- The attitudes of local labour (aggressiveness or moderation of trade unions);
- Possibilities of expansion (area of sites compared with floor area of existing plants, available manpower);
- Despatch facilities (geographical location, access roads, railway connexion, port area).

Having examined these factors, experts will have to prepare comprehensive proposals for reducing the number of models, production and assembly facilities and manufacturing companies. They should suggest various combinations in order to facilitate negotiations among the company managements and eventual arbitration by government authorities if there appears to be no prospect that these managements will reach an amicable solution.

Standardization of equipment and accessories

A similar exercise must be carried out in regard to the production of equipment and accessories, limiting the number of models in order to reduce prices and improve quality.

In many cases, there are no national standards for any domestically manufactured products, and government authorities (in principle, the Ministry of Industry) must take action to make it possible to standardize equipment and accessories for motor vehicles. The best solution is to set up a national standards body responsible for all standardization, with technical committees for individual industries.¹³

Taking as a basis the recommendations issued by the International Organization for Standardization (ISO), which may be too rigorous for the developing country concerned to adopt without modification at the outset, national standards should be formulated for mechanical components (screws, nuts, bolts, bearings, etc.), for manufacturing tolerances and for materials (steels, copper alloys, light alloys, etc.).

On the basis of these national standards and government regulations for the construction and use of motor vehicles, national standards can be established for the various accessories and items of equipment used in the manufacture of vehicles, limiting the number of models in the light of the range of vehicle models already decided according to the considerations stated above.

The regulations just mentioned, if they are not already in existence, must be promulgated by the government authorities in order to promote road safety and protect the rights of third parties. They deal with such matters as the efficiency of braking and lighting systems, levels of air pollution and noise emission, suppression of radio interference.

Here, too, there are international regulations which may be adopted as they stand or subject to minor alterations to allow for local conditions—for example, the maximum axle load for CV must take into account the strength of bridges in the country.

The formulation of standards must be done in collaboration with motor vehicle and accessory manufacturers, since the reduction in the number of models for one item generally involves modifying other items. In order to standardize generators, for example, the ratio between crankshaft r.p.m. and generator r.p.m. and hence the diameter of the drive pulleys and the length of the belt, will have to be changed in some engines. In reducing the number of carburettor models, only three or four should be adopted, which implies a single carburettor manufacturer. It will then be necessary to redesign the induction pipes of some engines and to make new tests in order to establish the best carburettor settings for each engine.

Standards should be established for the following items:

Electrical system: dynamos and alternators, starters, ignition coils and distributors, batteries, headlights, side lights, rear lights, dashboard instruments, fuel gauges, spark plugs, windscreen wipers, switches;

Fuel system: fuel pumps, fuel filters, air filters, carburettors, feed pumps, injection pumps, injection nozzles and nozzle holders;

¹³ See UNIDO, *Industrialization of Developing Countries: Problems and Prospects, Monograph No. 12, Standardization* (United Nations publication, Sales No.: 69.II.B.39, Vol. 12).

Wheels and tires;

Suspension and steering system: in particular, shock absorbers and ball joints;

Braking system: brake drums and discs, pumps, tanks, filters, brake linings, pipes and pipe connexions, cables;

Heating, ventilation and air-conditioning equipment;

Body accessories: hinges, locks, window winders, roof lights, sun visors.

The reduction in the number of models of equipment items and accessories described above should take into account the following factors:

The volume of demand for particular items from various vehicle manufacturers;

Technical possibilities of the assembly lines;

The quality and capacity of existing production facilities for equipment and accessories;

Units costs;

The quality of the design of the accessory, as measured by its suitability to do its job.

This reduction in variety should never result in a price increase, but always in a decrease, even when the manufacturer is compelled to use a size larger than the one he originally specified. The greater production volume of each of a limited number of models should make this possible.

Concentration of production facilities for equipment and accessories

Equipment and accessory manufacturers have proliferated even more extravagantly than vehicle manufacturers, under the influence of the very diverse demands of international vehicle manufacturers. The latter have tended to insist on the use of the models of equipment and accessories they use domestically in order to limit adaptation work and the risk of trouble arising from the fitment of products with which they were unfamiliar. The insistence on achieving an unreasonably high proportion of domestic content in the vehicle has had the same effect. As a result, locally manufactured equipment and accessories are often produced with cottage-industry facilities. Product quality is often mediocre and sometimes even unacceptable.

Energetic efforts should be made to bring about concentration in this field, following the same principles as for the concentration of facilities for vehicle production. The task will be even more difficult in this case, however, owing to the large amount of detail involved and the inevitable resistance of vehicle manufacturers when obliged to introduce modifications and change suppliers. The government authorities should give total support to the experts, and the investigations prior to taking decisions should be carried out with the greatest care and complete independence.

Service organization

After-sales service consists of vehicle maintenance, supply of spare parts and repair of worn or damaged equipment. What the manufacturer offers his customers under this heading is often very badly organized and sometimes even totally non-existent.

To function properly and for the sake of its reputation, the whole industry must pay special attention to these matters in order to ensure the normal degree of utilization of vehicles at moderate cost.

The international manufacturers should be asked to give the benefit of their experience in this matter and their advice should be followed with care.

Workshops for maintenance and repair should be distributed throughout the country in a sufficiently dense network so that customers can have recourse to them without too much difficulty and without travelling long distances. It is better not to sell in a particular area than to leave vehicles without service workshops. However, the organization of these workshops raises a certain number of problems.

Regular courses should be introduced to instruct technicians and operatives how to run a workshop correctly. This is especially necessary where, as often happens, the persons concerned have had no formal vocational training and have learnt what they know by working in a garage with men who have themselves received little training.

Instruction booklets in the local language and within the grasp of such people should be prepared by suitably qualified staff, who are themselves difficult to recruit. Any modification of equipment, even of secondary importance, should be pointed out, and the effect it may have on ordering spare parts should be explained.

The workshop should be properly equipped with general-purpose equipment such as hoists, air compressors, washing and lubricating apparatus, and also with special tooling designed by the vehicle manufacturer to facilitate removal of worn parts and reassembly.

Lastly, in order to limit the cost of maintenance and repair, the vehicle manufacturer should supply a list of commonly occurring jobs, stating the time normally required to perform the work correctly, broken down if necessary into elementary operations.

An effective supply of spare parts is more difficult to organize, the larger the number of vehicle models. This question is one of the major causes of friction between customer and garage operator and also between garage operator and manufacturer. Parts are often out of stock locally and the customer always believes he is charged too high a price for them, without realizing that packing, transport and storage all cause increases in costs.

Where parts are purchased outside the country, the importer must be able to acquire the requisite foreign exchange and this is often not the case. This amounts to the government authorities granting the means to purchase a vehicle but not those to use it.

The matter is particularly serious for old vehicles which went out of production more than fifteen years ago, because the international manufacturers no longer consider themselves bound to provide spare parts in such cases.

Depending on the importance of the worn-out parts, the vehicle must be scrapped or local manufacture organized (providing the number of vehicles in service warrants it and local means permit). There are Latin American countries where vehicles more than thirty years old are still in service, although repairs cost more than is warranted by the services the vehicles render. It is an economic and a political necessity to reduce the average age of the vehicles in use.

For parts in current domestic production, there should be no problem so long as the manufacturer includes spare parts in his manufacturing programmes and does not consider—as is sometimes the case—the sale of spare parts as a way of disposing of manufacturing rejects. Even so, these parts must be available at the right place at the right time. Depending upon the size of the country, this can raise problems of holding stocks on an area, in addition to a national, basis and of rapid transport.

The price of spare parts for both cars and CV should be as finely calculated as possible in order to make utilization of the vehicle economical. This is a question of crucial importance. Motor vehicle traffic will develop only if users can meet the necessary costs out of their normal budgets and if motor vehicle transport can compete with transport by rail or water. The costs of maintenance and repair, and hence of spare parts, should be supervised. The customer should not be treated by both the manufacturer and the concession-holder—as is too often the case—as a “milch cow” in regard to service.

There is no problem, while mass production is continuing or in the years following the discontinuation of production of a model, provided sufficient quantities of the parts have been put into stock. It must be borne in mind, however, that the capital tied up in these stockpiles must be remunerated, that the cost of maintenance normally increases as the vehicle grows older—and that a vehicle generally requires spare parts.

The problem of distribution is not a simple one if spare parts are to be immediately available when required. This means that the repair workshop must have them in stock, which raises stockpiling and financing problems, or else be able to obtain them without delay from an area or national warehouse, which raises problems of warehouse organization and rapid transport.

Solutions exist. They must be applied, taking advantage of the experience of specialists in this field. Each international vehicle manufacturer has his own ideas and a set of measures to meet various situations, from the small warehouse in each locality to computer-controlled operations of spare-parts provisioning and distribution.

Creation of a new motor vehicle industry

In many ways it is simpler to use the experience gained in the last twenty years when creating a new industry than when seeking to improve one that has run into difficulties. The government authorities should decide to establish

a motor vehicle industry only after carrying out a thorough market survey something which has not always been done in the past. They should then decide how much capital can be devoted to this purpose, in the light of available capital resources and other priority investments.

After these preliminary decisions, it is necessary to determine the order in which the programme should be carried out. The Government should fix medium- and long-term goals by a specific and clear decision, for example, to meet all requirements in certain categories within x years by assembly of CKD kits and to incorporate $n\%$ "domestic content" within y years.

Motor vehicles priorities

The Government must also decide the order of priorities for production of motor vehicles between cars, light CV, heavy CV, PSV and farm tractors. Everything cannot be done simultaneously and the best solution is not obvious *a priori*: it depends on many factors which only a thorough study can evaluate.

At the Karlovy Vary Seminar to which reference has been made, some experts advocated beginning by the assembly of heavy CV. Simply because this order of priorities was successful in Japan and Spain, that is no reason why it should be the most suitable everywhere. A glance at the forecast new registrations shown in tables 4 to 8 suggests the contrary. There must be a domestic market large enough to provide economic justification for this order of priorities and this means a large population, wide geographical dispersion of industrial production, inadequate other means of transport and high freight costs when CV are imported complete by the country concerned.

Other experts attending the Seminar advocated the assembly of low-cost vehicles capable of carrying passengers and light non-bulky loads simultaneously in order to speed up the transport of health service personnel and those engaged in industry and trade, thereby promoting general economic development.

In fact, the choice of priorities will be as much political as economic, depending on the philosophy of the political system. In a centrally planned economy, priority will generally be given to heavy lorries and collective passenger transport. In other countries, priority may often be given to private means of passenger transport. The choice will be facilitated if a national development plan has been drawn up which clearly lays down priorities for the various sectors of the economy and distributes the available investment resources among them.

The number of models in each vehicle category

In deciding how many models to produce, motor vehicles may with advantage be grouped into the following categories:

Cars, subdivided according to cylinder capacity and body types

Vans

Light goods vehicles (carrying capacity less than 2 tons)

Medium goods vehicles (carrying capacity 2-5 tons)

Heavy goods vehicles (carrying capacity from 5 tons to the maximum permitted)

Road tractors and semi-trailers

Tipper lorries for building and construction work

Cross-country vehicles, 4×4 and 6×6

Buses and coaches subdivided according to number of seats

The aim should be to keep the number of models as small as possible, and the initial selection will be made in the light of market requirements and the development plan, if any. In the case of CV and PSV, it is important to prescribe the maximum number of engine models that may be used. Vans and light goods vehicles can be equipped with car engines of appropriate cylinder capacity.

The idea of assembling all types of vehicles ought to be discarded from the outset; very specialized types such as 4×4 and 6×6 vehicles for building and construction work should be imported complete.

The requirements of the armed forces should also be taken into consideration from the outset, in order to avoid having subsequently to add special vehicles for their use. The Government may have to arbitrate firmly on this point, for military leaders tend to ask for special vehicles even for uses where ordinary goods vehicles are quite suitable.

The number of motor vehicle producers

We have seen that the proliferation of production facilities is a major cause of high-cost levels and mediocre quality. A minimum size of plant should be determined for each category on the basis of local economic conditions. No general rule can be laid down. In the United States, the figure is 800 vehicles a day for car-assembly plants, while in Europe it is 200. Rather higher figures apply to plants with manufacturing operations—250,000 units a year in the United States, 50,000 in Europe. In the manufacture of CV, we find a minimum size of 20,000 units a year in the United States and 3,000 to 20,000, depending on carrying capacity, in Europe.

Once the minimum size of the production facilities has been determined, the number of enterprises will be fixed according to the size of the market. In order to maintain some degree of competition, it can be agreed that there shall be at least two enterprises producing cars, but for CV one enterprise may have to suffice in most countries.

In the case of assembly plants, it will be useful to group different models and even different makes in a single enterprise in order to make maximum use of the capacity of painting lines. These installations, if they meet quality standards, are very costly.

The regulations governing the incorporation of domestic products

Experience has shown that caution is to be counselled in framing the regulations about achieving "domestic content", if acceptable cost prices and quality are to be achieved (see chapter 3). Formulae as flexible as those adopted by

Australia and the Republic of South Africa are possible only in markets of more than 150,000 vehicles a year.

The basis on which the percentage of "domestic content" is to be calculated must first be defined. There are several possibilities:

- (a) The weight of parts, equipment and accessories manufactured domestically, compared with total vehicle weight;
- (b) Using the price levels ruling at the foreign producing factory, both for the complete vehicle and for individual items in a CKD kit, a similar comparison in terms of value;
- (c) As for (b), but adding to the foreign price levels the on-costs of delivery to the local assembly plant;
- (d) A comparison in terms of value, based entirely on cost levels at the local assembly plant.

The approach in (d) is too complex and requires local accounting arrangements of some magnitude. As between (b) and (c), it should be remarked that (c) has the advantage of taking into account the costs of packing, freight, insurance, customs duties and transport from port of entry. The simplest, and that which gives rise to the least debate, is the first approach. Scales suffice to settle any dispute.

The choice should lie, in most cases, between (a) and (c), but once it has been made it should not be modified, for that would cause serious disruption to operations and necessitate a fresh review of the plans prepared by the domestic and international manufacturers for the whole project.

The percentages of "domestic content" and time limits for achieving them should be decided only after a thorough study on the spot of existing industrialization, investment possibilities in each sector, the effect of distance from the foreign producing factory and other factors examined in chapter 3.

There are many problems to solve in exceeding even such a low "domestic content" as 15 per cent, for this implies the existence or creation of plants manufacturing glass, tires, textiles, batteries and paints.

Similarly, the time limits should be studied with care. In actual fact, the whole plan for the industrialization of the country is affected. If there is a development plan, it can provide guidance. If the question is left to private initiative alone, the time limits must be lengthened and Government authorities must adopt an understanding attitude about the dates being met, free from insistence on written formulae.

Since the cost price will nearly always increase as the "domestic content" grows, there is no advantage in unduly hastening the process; the development of domestic manufacturing operations should be harmonized with the availability of foreign exchange. In any event, the time limits should be reckoned in years, not months.

Incentives to entrepreneurs

The incentives offered should evidently be such as to attract domestic and international entrepreneurs, or at least to avoid discouraging them. They may take many forms.

Perhaps the commonest incentives are those which impose customs restrictions on the import of finished vehicles. There can be total prohibition from a specific date, related to the start of assembly operations. There can be quotas for imports of models that compete with those to be produced locally. In this case, the regulation can be brought into effect before local assembly starts in order to build up an order book, an exception being made for urgent requirements. Differential customs duties are often adopted - high for vehicles imported complete and low for CKD kits - in order to encourage customers to "buy national". The rate of duty on complete vehicles must be very high, however, since many customers will not hesitate to pay a high price for an imported vehicle, given the choice, out of fear that a locally manufactured vehicle will be of poor quality, in particular as regards painting and finish.

The Government may grant reductions or remissions, for a limited period, of the taxes and duties normally paid on investments and trading profits, and of the cost of trading licences and various local taxes. The approaches are many and obviously depend on the tax system in the country concerned. It would be unsound to allow such measures to constitute a permanent privilege; they should be conceived as temporary assistance for a few years when the new industry starts up and is therefore financially weak.

In the context of its general industrialization policy, the Government may try to attract industrialists by means of a subsidy to areas where they would not otherwise locate owing to the geographical situation, the climate or difficulties of access.

Specially reduced rates may be offered for the transport of raw materials and the assembled vehicles, with the same object as the location subsidy mentioned in the preceding paragraph. This kind of measure must be permanent, however, and this raises matters of general policy which must be carefully weighed before taking a decision. Inevitably, a similar concession will have to be granted to other industries. The effects on transport companies, even if state-owned, may have to be compensated.

State participation in company capital, either directly or through a State bank or Government body, may be regarded as an incentive. Here again, general policy issues arise. Centrally planned economies generally insist on such participation, which has the advantage of making it possible to supervise the enterprise from within (by placing civil servants in key managerial posts), but also disadvantages: the State shares responsibility for management and inevitably favours the enterprise in some cases of dispute. The situation is tolerable only if the State holds the same percentage of equity in all the various enterprises established in the motor vehicle industry.

Placing vehicle orders for the army and civil agencies of government provides further opportunities to assist the new enterprise technically and financially in its starting-up period. Wherever possible, the orders should be programmed for delivery over several years. This measure, which appears obvious, is often not taken because the individualism of some agencies causes them to insist on their freedom of choice regarding the equipment they use.

In due course, when the costs of domestically-produced vehicles have become nearly competitive internationally, the Government can aid exports by remitting certain taxes which enter into costs. Examples of this are the British purchase tax, which is levied only on goods sold in the domestic market, and the value-added tax in the EEC.

The State should also exercise some control on the credit terms allowed for purchase of motor vehicles. The elements to be controlled are the percentage of the total price to be paid in cash at the time of ordering, the number of months over which the balance is paid by instalments, and the rate of interest charged on the balance.

It is easy to imagine that there will be few or even no purchases on credit at first, but they will be necessary as the market expands.

The attitude of the Government to this question, as a matter of general policy, should not be kept in the dark. In order to take decisions on the basis of relevant factors, entrepreneurs need to know several years in advance what marketing system they will have to adopt.

Negotiation of regional co-operation agreements

An integrated market with neighbouring countries may make it possible to achieve a volume of production at which the resulting economies of scale bring down cost prices to a level acceptable to the participants, whereas costs would be too high if each of them produced only for its domestic market.

The example to quote in this regard is the agreement of May 1967 among five Latin American countries, namely, Chile, Colombia, Ecuador, Peru and Venezuela, to establish a joint production programme.

The principles which should be embodied in such agreements make applicable to a region the desiderata for a country described above:

Limitation of the number of vehicle models and units;

Limitation of the number of assembly lines and manufacturing enterprises;

Standardization of accessories, equipment and parts produced.

In addition, there must be duty-free movement of components and parts among the co-operating countries.

Such agreements are obviously very difficult to conclude since national feelings, many private interests and often political factors (rooted in history, different political systems, rivalry of politicians) stand in the way.

The areas where there is scope for such regional agreements have been pointed out in chapter 2, when commenting on the level of new registrations forecast for the end of this decade.

Even where there are affinities of race, religion and history, it is easy to see how many problems would be involved in reaching these agreements. If there is even a slight probability of success, negotiations should be undertaken at a very early stage, for the task becomes much more difficult when vested interests have already been created by setting up enterprises in certain of the countries.

Supervisory agency

The establishment is advisable of a special body under the Ministry of Industry or the Development Planning Board to prepare and implement the development of this industry. The function of this body would be to achieve co-ordination and continuity of action by government authorities. In particular, it would be responsible for preparing, in co-operation with the industrialists concerned, regulations which limit the number of models and enterprises, fix the percentages of "national content" and time limits for reaching them, grant incentives to the industry and ensure the standardization of equipment and accessories. It would also, where appropriate, negotiate regional co-operation agreements and assistance from international banks.

The choice of vehicle models

The fact that the number of models must be strictly limited only serves to render more complex the technical problems raised by the need to make a choice.

The technical conditions to be fulfilled will have to be specified—maximum speed, carrying capacity, minimum acceleration, cost price, durability, maximum fuel consumption. However, the choice of the models themselves should be left to the entrepreneurs, so that they are fully responsible in the subsequent development of the industry.

Once these conditions have been laid down, account will also have to be taken of local conditions, of which the following are the most significant:

The contours of the country, its average altitude and the steepness of the gradients frequently encountered—particularly important for heavy CV;

The extent and condition of the road network. Where there is virtually no road system, as in certain countries of Africa or Asia, priority may be given to cross-country vehicles, such as jeeps for passenger transport and 4×4 or 6×6 for CV;

Limits on size or weight on account of existing road facilities (tunnel sizes, maximum loads of bridges, width of mountain roads and river ferries);

Annual minimum and maximum temperatures, which influence the specification of electrical equipment (starting the engine, temperature control of the passenger compartment in all seasons, as well as engine cooling);

The amount and kind of dust in the air depending on the state of the roads, prevalence of sand storms etc.;

Risk of corrosion from atmospheric or snow conditions or passage through river fords.

Conditions of use must be specified for all types of vehicle and in particular for heavy CV and PSV, since the quality of drivers available may in these cases influence the choice of model. The conditions of use may vary between the city, suburban areas and the countryside as well as between express highways, roads, tracks and cross-country transit.

Existing production facilities should be taken into account when considering the bodywork of the models proposed. In the developed countries, the bodies of cars and the cabs of CV are a subject of competition as regards style. The frequent result is to complicate shapes without meeting any functional requirement. A developing country does not need cars in the latest fashions of Detroit or Turin. Even Detroit seems to be awakening to the realization that frequent model changes do not serve any real purpose and often result in a price rise of up to \$1,000 per vehicle sold.

These sophisticated lines complicate fabricating problems, require costly stamping tools, sheet metal of very high quality and windcreens and rear windows of complicated shapes. Production experts must speak up at this stage to eliminate models which, while embodying all the qualities required, would pose problems that are economically insoluble under current conditions.

The prices and qualities of the fuels and lubricants generally on sale throughout the country can influence the choice of models, eliminating those which require high-octane fuels or have too high a fuel consumption.

Possibilities of export to neighbouring countries should be taken into account if economic conditions permit, in order to allow for a larger market without creating new models or even, if possible, variants that complicate production programmes and always increase the size of the stocks to be financed.

A short list has to be drawn up for each model, consisting of three or four alternatives available on the world market which appear to comply most closely with requirements. Competitive road endurance tests will then be undertaken by the future manufacturer's technical staff, to check the performance of each vehicle after making the modifications that have been proposed to suit local conditions. If, however, there is an official body responsible for approving vehicles before they are placed on the market, it can be asked to undertake or participate in these tests, thereby saving time and money in the long run. In any event, it is essential that the tests should be carried out in co-operation with the manufacturers of the models selected, in order to give each model every possible chance and to prove the adaptations made.

In order to be conclusive, these tests must be spread over a full year in countries with extreme climates and should embrace all the special local conditions enumerated in this section. Some vehicles will be eliminated owing to inadequate endurance or unsuitability to local conditions. The remainder can be ranked in order of priority. It is only at this stage, logically, that contracts can be concluded between the parties concerned, with commercial and financial considerations influencing the final choice.

Modifications in the basic models chosen for manufacture

There are two types of modifications to be made in the basic model, those which are obligatory and those introduced by the international manufacturer in the course of production at his main factory. We first discuss the obligatory modifications.

Domestic legislation may, for example, specify the size of number plates or require the installation of an anti-theft device. Such modifications should be limited in number and importance if, as recommended above, the national regulations for vehicle construction and use are in line with those laid down by international bodies.

Modifications to meet special local operating conditions will be determined by the international manufacturer's experts, following the studies and tests carried out. Their thorough knowledge of the vehicle and its possibilities will enable them to determine whether the original electrical layout should be changed by increasing the storage capacity of the battery or the power of the dynamo or alternator; whether a finer-mesh air-filter element should be fitted; whether the compression ratio of the engine should be changed in order to make the best use of the fuel on sale in the country, and so on.

It is a general requirement that the markings on the instrument board and the various maintenance plates should be in the language of the country, and that the readings on measuring instruments (speedometer, mileage indicator, fuel, oil-pressure and water-temperature gauges) should be in the system used in the country concerned (units of length, capacity, temperature, pressure).

When modifications are introduced by the international manufacturer in the course of production the question is much more complex. Such modifications often pose problems for the domestic manufacturing enterprise and constantly give rise to conflicts among the various branches of its management. The outward appearance of the vehicle may be altered, in which case the modifications raise questions of marketing of stocks, depreciation of earlier models and pricing of second-hand vehicles.

Equally serious in their consequences, although invisible, are modifications affecting the interchangeability of mechanical parts. They raise questions regarding the stocking of spare parts at the factory and in the spare-parts warehouses of concession-holders and agents. There is also the problem of identifying the vehicles in use with the old or new design of mechanical part, for purposes of service maintenance.

Dealing with these matters complicates internal administration and results in the distribution of technical bulletins throughout the sales and service network, changes in production and inspection equipment and higher stocks of spare parts at all levels. These modifications are a fruitful cause of error in deliveries and lead inevitably to an increase in cost price.

Every management division is capable of causing the introduction of modifications. The commercial division may request them on marketing grounds, in order to compete better and encourage customers to change cars. They may affect the external shape of the body (wings, decorative radiator grills) or the interior fittings (instrument panel, floor mats, upholstery); or they may improve performance.

The service division, on the basis of field experience, requests improvements in safety (road holding, strength or wear of front and rear axles, tire wear, brake reliability and wear, locks) or in endurance (engine, transmission and

steering). Other modifications are introduced for convenience of maintenance or repair work.

The methods engineering division requests changes in design for the purpose of improving quality, reducing production time or automating manufacturing or assembly operations.

For that matter, when there are suggestion boxes in which employees can place their suggestions for improving production conditions, any of the personnel of the enterprise can theoretically cause a modification.

There is always a body whose job is to screen all requests for changes, evaluate their repercussions on the cost price and the operation of various departments, eliminating all those which are not clearly useful. In most enterprises, this body reports to the general manager.

The key question is whether the licensed manufacturer should apply all the changes made by the international manufacturer. When he is simply assembling SKD or CKD kits he generally has no choice, since the collection of parts dispatched by the international manufacturer undergoes the same modifications as parts used for his own production. The assembler must simply ensure that the sales and service network is informed early enough to lay in stocks of modified spare parts and be able to identify the vehicles fitted with modified parts in order to avoid errors in provisioning.

As soon as some domestically manufactured parts are incorporated, however, the question may easily arise. It is in the interests of the international manufacturer that all the modifications he introduces should be copied locally, so that the vehicles manufactured under licence do not differ from those which he manufactures. He must regard this as desirable for the sake of his world reputation, and in order to avoid making spare-parts provisioning in his export markets inextricably complicated. Cars often leave their country of manufacture and it must be possible to find the correct spare parts everywhere.

The interest of the domestic manufacturer is less clear-cut. He must ensure that the vehicle he manufactures does not compare unfavourably with the licensor's product, especially if he wishes to export it. He must therefore prevent his vehicle from differing from that product in appearance and ensure interchangeability of parts. On the other hand, he must also keep a very close watch on his costs and avoid anything which might increase them (scrapping of unamortized tooling, holding larger stocks of spare parts, stocks of unmodified cars to be sold at a discount, etc.).

The best approach is to be selective in introducing modifications. The rule should be to apply as soon as possible and without question only those which are necessary to maintain interchangeability with the licensor's product or which affect the safety of the vehicle and its endurance. Other modifications should be examined in collaboration with the international manufacturer on an individual basis to evaluate the benefits they should bring. Those eventually accepted should be grouped together to be incorporated at definite intervals (for example, yearly or every second year), with a change in the model designation of the vehicle to prevent errors throughout the network.

*Standardization and concentration of production facilities
for equipment and accessories*

Standardization and concentration of production have been discussed in relation to the improvement of existing motor vehicle industries. The remarks apply with equal force when setting up a new industry. It is essential that this work should be undertaken as soon as possible. If the incorporation of domestically manufactured equipment and accessories is to take place in the fairly near future, the task is one of the most urgent.

The government authorities should adopt just as strict approach to concentration of production in regard to equipment items and accessories as in regard to the vehicle as a whole, since their cost represents up to 30 per cent of total vehicle costs and customer opinion is more influenced by their quality than that of the basic elements of the vehicle.

Commercial organization

As a rule, there is no lack in the developing countries of persons wishing to engage in trade. Nevertheless, specialists capable of correctly conducting sales and services activities for motor vehicles are in just as short supply as technicians. When selling a carpet or horse, the object may simply be to convince the customer that he is getting a good bargain, to hand over the item to him and disappear to other parts. The motor vehicle manufacturer must strive to provide the customer with a high-quality product, to maintain it and if necessary repair it, always at the lowest possible price in order to encourage him to remain true to the make concerned. The long-term survival of the enterprise can be ensured only on this basis.

The vehicle salesman should be the customer's permanent adviser and play the part that the family doctor plays as regards the family's health. To fulfil this essential task, he should have both technical and commercial ability. He must know what the vehicle can and cannot do, not exaggerating, to extract an order, and must be able to advise on proper operation of the vehicle, maintenance and repair.

The distribution of sales and service agencies should be thoroughly studied to ensure that it covers the whole territory, but not to excess, since each concessionaire should be allotted a large enough market for him to earn a decent living while receiving a reasonable rate of commission.

The experience of international manufacturers can be of great value in establishing a reliable network which will be capable, once the easy, favoured years are past, of selling the company's production, year in, year out. Their commercial experience, in fact, is likely to be as valuable as their knowledge of production engineering.

The remarks made about organizing after-sales service in existing motor vehicle industries apply with equal force to the creation of a new industry. After-sales service should be organized at the same time as the sales network. The investment required for this purpose should not be overlooked in listing heads of expenditure when beginning to study the project.

Financial studies

It goes without saying that all this action should be preceded and accompanied by financial studies which are as precise as possible, in order to ensure that the capital equipment, material supplies and stocks can be financed in good time.

The size of the investment in fixed assets cannot be indicated in this discussion, because there are no general rules. In each country, the investment required will depend above all on the scale of production and the percentage "domestic content" that must be reached.

In most developed countries, the equipment and accessories that it is customary for the vehicle manufacturer to purchase from other enterprises account for over 30 per cent of cost price - the range of items involved is by no means the same for each manufacturer. In a developing country, the domestic manufacturer may find himself manufacturing an item that the international licensor normally purchases, to ensure a high enough standard of quality or, in the absence of any domestic source of supply, to enable him to achieve the prescribed percentage of "domestic content". In any case, it would be misleading to calculate only the investment necessary on the part of vehicle manufacturers and to ignore the investment in other industrial sectors without which a fully integrated national vehicle industry cannot be created. The latter investment will be affected particularly by the existing degree of sophistication and capacity of the engineering and metallurgical industries (see below).

To illustrate the orders of magnitude involved, let us take the case of a small economy-class car such as the BLMC Mini, Citroën Dyane, Fiat 850 or Renault R4. A vehicle manufacturer might have to invest \$60-\$75 million in production facilities for an annual output of 50,000 vehicles, if his factory contributed 35 to 40 per cent "national content"; for an annual output of 100,000 vehicles the investment might be \$110-\$140 million. A number of other enterprises to supply domestically manufactured items of equipment and accessories, contributing up to 30 per cent of the vehicle's "national content", might well absorb collectively a similar investment to that required by the vehicle manufacturer.

As soon as models have been chosen and starting-up programmes established, the domestic vehicle manufacturers should prepare forecasts of financial commitments up to the date when their plants are expected to reach full operation and also, obviously, an operating account for subsequent operation at full capacity. In order to be financially sound, however, the business must still make a profit if it operates at 80 per cent of maximum capacity.

Similar procedures should be followed in the case of major projects for vehicle equipment and accessories.

It is on the basis of such financial plans that the entrepreneurs will negotiate with the Government for special incentives, with banks for the loans they will need and with domestic and foreign partners concerning the amount of capital required and their respective shares.

Training of managers and technical personnel

There is no doubt that personnel training is one of the most complex aspects, and perhaps the most difficult to deal with, of establishing a motor vehicle industry. This is particularly true in countries where, despite efforts already made, the illiteracy rate remains high and the level of general education very low. The industry cannot operate without professional engineers, good technicians and draughtsmen, and skilled workers such as mechanics, repairmen, fitters, operators of lathes, milling and boring machines, and painters, especially if the incorporation of domestically manufactured products is to be expanded. Even unskilled labour should know how to read, write and count and be able to work neatly and accurately.

Therefore, technical education must be promoted quickly—and not only for the motor vehicle industry, but for all industrial sectors. It needs to be done at three levels: primary, to train apprentices in various skills; secondary, to train draughtsmen and technicians for manufacturing, methods engineering, assembly, testing and after-sales service, likewise foremen and shop superintendents; higher, to train professional engineers, heads of divisions and managers for technical, commercial, administrative and financial departments.

Basic instruction can be imparted by public institutions or else private institutions established and conducted by the industry. It must be essentially practical in purpose and not simply a copy of programmes developed in industrially advanced countries, which now show a tendency to be too theoretical and general. The need is to train realists who know how to put their hands to the service of their brains and are able to carry out limited and specific tasks with precision and discipline.

Specialized and advanced training can then easily be added at the enterprises. The foreign experts temporarily seconded by international manufacturers can act as teachers and instructors, or other foreign personnel may be brought in for this specific purpose.

The success of the Japanese and Spanish motor vehicle industries is due above all to the fact that in both countries an organized educational system already existed at all levels and manufacturers had no difficulty in recruiting skilled staff for all posts.

The Government will have to allocate for the training programme the investment credits necessary to build schools and universities, and make provision in its budget for the recurrent costs involved in their proper operation. In order to gain time, most Governments will have little alternative to recruiting in the developed countries good teachers of general and, above all, technical subjects.

Promotion of supply industries with high standards of quality

Both vehicle manufacturers and firms producing equipment, accessories and parts for vehicles require high-quality materials. High percentages of "domestic content" cannot be achieved until domestic suppliers of materials

can meet the quality standards. The motor vehicle industry has to use special high-quality materials in all areas and highly developed manufacturing processes for casting, forging, stamping and fabricating. In the major industrialized countries, material accounts for nearly 30 per cent of vehicle cost; an industry which had to import all its materials would thus produce vehicles with a maximum of approximately 70 per cent "national content", even if everything were manufactured domestically. The government authorities must therefore make the same effort to promote the high-quality processing of raw materials as to promoting the manufacture of vehicles and their equipment and accessories.

Structural and special steels for high-performance parts, such as exhaust valves, valve springs, water-pump shafts, can continue to be supplied from abroad, for they account for only a very small percentage of the vehicle either by weight or by value.

Sheet metal for stamping bodies and mechanical parts will almost always be impossible to produce to the required high quality in a developing country for a long time. Stamping shops should be planned on the basis of imported sheet, which implies a high level of production and a long pipeline for supplies.

A single foundry for chill casting and pressure diecasting of light alloy parts will probably suffice for a long time. It will require costly tooling and technically competent management. It should be set up under the auspices of the aluminium production industry, if there is one in the country.

A domestic plastics and paints industry can be envisaged only if demand exceeds a certain tonnage. A calculation of profitability must be made, including other engineering industries and the chemical industry in the estimation of demand. Production of plastics and paint is likely to prove worth while if there are petroleum resources within the country or even if the construction of refineries is planned.

It must not be assumed that existing glass-works will automatically be able to manufacture windows for motor vehicles. For obvious reasons of safety, very exacting specifications must be satisfied with regard to optical qualities, particularly freedom from distortion, and the way the glass shatters under impact. The complicated shapes of windcreens and rear windows also call for appropriate equipment and the necessary technical competence.

Precision engineering

Measuring instruments and control apparatus must receive very special attention from government authorities. They are indispensable to all mechanical engineering, not only to the motor vehicle industry. A domestic industry in this sector would yield many advantages and does not call for very large investments. It does require extremely well qualified staff, however, and highly skilled labour. The manufacturing operation could be attached to the national administration of weights and measures which maintains the standard measurement units.

Fuels and lubricants

International standards for fuels and lubricating oils must obviously be respected. If these products are imported there is no problem, for the major suppliers easily conform to these standards. If there are domestic refineries, the Government will have to make sure by means of frequent checks that they observe these standards, particularly as regards octane number, sulphur content and the distillation curve. Vehicle performance and facility of use depend on this, particularly in extreme climates.

Storage installations and transport arrangements should be supervised to avoid the introduction of water and foreign bodies and to prevent evaporation, which, in tropical countries, modifies fuel characteristics.

The role of the United Nations Industrial Development Organization (UNIDO)

UNIDO is able to provide expert assistance and advice to governments and industrialists of the developing countries at all stages in the establishment and development of a motor vehicle industry. Those stages are singled out for special mention here at which such international assistance is likely to be especially valuable.

Economic survey of the medium- and long-term motor vehicle market

We have seen that, before deciding to establish a motor vehicle industry, it is indispensable to make a long-term projection of the demand for cars, CV and PSV. A survey on the spot by experts will assess not only the probable evolution of new registrations but also the size of the investments which would have to be made under different alternatives of assembly or manufacture, the approximate vehicle cost prices which would result from these various alternatives and the expected savings in foreign exchange.

The motor vehicle industry supervisory agency

UNIDO can provide consultants to assist national civil servants in establishing the supervisory agency recommended in this chapter. They can pass on the experience already acquired by similar agencies in other countries and train these civil servants for their functions.

Consultants can prepare for the supervisory agency an accurate and objective inventory of existing resources and facilities in the various industrial branches concerned, namely, metallurgy, iron and steel making, chemicals, electricity generation, precision engineering and sheet metal working. They can follow this up by collaborating with the officials of the agency to define the programme for vehicle and accessory manufacture, in detailed terms of the number of models and the technical performance.

UNIDO can provide the consultants to advise the officials in charge of the agency concerning all these matters.

Choice of vehicle models for production

The collaboration of UNIDO experts is particularly important in the performance and endurance tests of the vehicles proposed for manufacture. Owing to the complexity of the problem there is need of advice from highly experienced and completely independent consultants to devise, direct and evaluate such tests.

Negotiation of contracts with international manufacturers

Experts made available by UNIDO can perform a useful function by informing those who negotiate contracts with international manufacturers of experience in similar cases already studied in other countries and by sharing with them their knowledge of international jurisprudence in the matter.

Preparation of the operating plan

The plan of operations for a new factory should be studied in the fullest detail in order to avoid loss of time and unnecessary expense. The technical, economic, commercial and financial aspects can be examined by specialists in these fields.

It is clear that, in all these studies on which plans for action are based, the assistance of UNIDO experts can inject not only the competence and experience of well-informed persons, but an impartiality and independence of view which will prevent those responsible from taking hasty or ill-prepared decisions. To have maximum effect, the collaboration of outside experts should not be episodic, but should be spread over a period sufficiently long to enable them to see how the plan is progressing and intervene to correct initial errors of judgement—or even to modify the whole plan if an unforeseeable development sufficiently alters the situation.

FURTHER NOTES ON THE FORECAST OF DEMAND IN 1980

Population and GNP forecasts for 1980

The average annual growth rate of population between 1957–1959 and 1964–1966 has been applied to the 1968 data for each country in order to arrive at the population forecasts for 1980. The GNP forecasts have also been made with 1968 as the base year but two alternative assumptions have been adopted. In alternative A it is assumed that the average annual growth rate of GNP between 1957–1959 and 1964–1966 will be maintained until 1980.

Alternative B assumes an annual rate of growth of GNP of 6 per cent for each developing country under consideration, except that the forecast in alternative A is retained where it assumes more than 6 per cent. For the bulk of the developing countries, alternative B implies a significantly higher growth rate; the alternative forecasts A and B may be regarded as low and high estimates, respectively, albeit with some reservations.

The conversion of GNP data from national currency into US dollars presents considerable difficulty in certain cases. Whenever possible, the exchange rates given in the United Nations' *Yearbook of National Accounts Statistics for 1968*, Vol. II, pages 54–65, have been used.

In view of the reservations made on page 66 of the above publication the GNP and *per capita* GNP figures for different countries cannot be closely compared, but this does not invalidate the use of the method to forecast the situation in 1980, country by country.

Since alternative A assumes the continuation of the trends of the recent past, the forecasts and the comment based on this alternative are not systematically optimistic; or if they are, it is in the sense of expecting a continuing expansion and hoping that particular countries now in difficulties will be able to surmount them quickly without detriment to their long-term economic growth. The alternative B analyses the situation in systematically optimistic terms. It serves the further purpose of showing the sensitivity of the vehicle forecasts to GNP forecasts.

Tables A-1 to A-5 show, with regard to the population and *per capita* GNP of the developing countries in each area, the 1968 data and the resulting forecasts for 1980 according to the alternative assumptions.

TABLE A-1. POPULATION AND *per capita* GNP
AREA 1: THE CARIBBEAN AND LATIN AMERICA

	Population			Per capita GNP in dollars		
	1968	Annual	Forecast	1968	1980	
	(Thousands)	growth rate (Per cent)	1980 (Thousands)		Forecast A	Forecast B
<i>The Caribbean and Central America</i>						
Costa Rica	1,634	4.2	2,673	456	508	555
Dominican Republic	4,029	3.6	6,199	290	385	385
El Salvador	3,266	3.4	4,883	277	363	363
Guatemala	4,864	3.1	7,016	315	418	431
Haiti	4,671	1.9	5,854	91	91	142
Honduras	2,413	3.3	3,562	256	286	343
Jamaica	1,913	1.9	2,398	496	672	772
Mexico	47,267	3.4	70,664	566	751	751
Nicaragua	1,842	3.2	2,688	373	495	505
Panama	1,372	3.2	2,002	609	958	958
Trinidad and Tobago.....	1,021	3.0	1,455	733	1,190	1,190
Sub-total	74,292	3.2	109,394	476	636	646
<i>South America</i>						
Argentina	23,617	1.6	28,569	739	852	1,187
Bolivia	4,680	1.4	5,530	173	234	284
Brazil	88,209	3.0	125,742	316	389	437
Chile	9,351	2.3	12,286	569	731	848
Colombia	19,825	3.2	28,933	359	418	486
Ecuador	5,695	3.3	8,408	229	261	304
Paraguay	2,231	2.7	3,071	229	234	327
Peru	12,772	3.0	18,206	291	425	425
Uruguay	2,818	1.4	3,330	650	725	1,066
Venezuela	9,686	3.4	14,467	944	1,053	1,252
Sub-total	178,884	2.7	248,542	419	498	596
Total	253,176	2.9	357,936	437	540	610

Sources: For 1968 population, United Nations, *Monthly Bulletin of Statistics*; for 1968 GNP, United Nations, *Yearbook of National Accounts Statistics 1968*, Vol. II (United Nations publication, Sales No.: 70.XVII.3) and *Monthly Bulletin of Statistics*; for growth rates of population and *per capita* GNP (forecast A), OECD Development Centre, *National Accounts of Less Developed Countries, 1950-1966* (CD/R/NA.3), Paris, July 1968, and supplementary bulletins nos. 1, 2 and 3.

Forecasts of the number of vehicles in use in 1980

As regards cars, the key assumption is that for every dollar increase in *per capita* GNP between 1968 and 1980 the number of vehicles in use per thousand inhabitants will increase by a constant amount; this constant is assumed to be identical for each country in a given area or sub-area, since the geographical conditions and the degree of mechanization to be found in daily activities of

TABLE A-2. POPULATION AND *per capita* GNP

AREA 2: SOUTH-EAST ASIA

AREA 3: THE REST OF ASIA, EXCLUDING THE MIDDLE EAST

	Population			Per capita GNP in dollars		
	1968	Annual	Forecast	1968	1980	
	(Thousands)	growth rate (Per cent)	1980 (Thousands)		Forecast A	Forecast B
<i>Area 2</i>						
Burma	26,389	2.0	33,467	78	92	120
Indonesia	112,825	2.3	148,241	96	96	143
Khmer Republic	6,557	2.6	8,929	160	210	231
Laos	2,825	2.5	3,799	72	94	105
Malaysia	11,840	3.1	17,079	325	440	445
Philippines	35,883	3.3	52,978	301	335	403
Singapore	1,988	3.0	2,834	723	939	1,001
Thailand	33,693	3.1	48,602	166	261	261
Viet-Nam, Rep. of	17,414	3.0	24,824	201	264	278
Sub-total	249,414	2.6	340,753	158	196	232
<i>Area 3</i>						
Afghanistan	16,113	1.8	19,961	80	108	126
Ceylon	11,964	2.6	16,293	151	170	218
Hong Kong	3,925	3.7	6,070	620	858	858
India	523,893	2.4	696,411	80	96	118
Iran	27,081	2.7	37,282	295	440	440
Korea, Rep. of	30,470	2.8	42,439	194	274	274
Nepal	10,652	1.8	13,196	75	98	119
Pakistan	109,520	2.6	149,144	140	190	202
Sub-total	733,618	2.5	980,796	109	146	164
Total	983,032	2.5	1,321,549	122	159	182

Sources: As for table A-1.

the population are broadly the same. The constants were established empirically. A set of graphs was prepared, one for each area, on which the points represented the *per capita* GNP and the number of cars in use in 1968 for the various countries. On each of these scatter diagrams a trend line (or one for each sub-area) was then drawn, whose slope defined the value of the constant.

Exactly the same procedure was followed to forecast the number of PSV in use per thousand inhabitants in 1980. Multiplication by the forecast 1980 population, in thousands, then gave the forecast total number of cars or PSV (as the case might be) in use in 1980.

As regards CV, the method of calculation was even simpler. For each country the ratio of the forecast *per capita* GNP in 1980 to the actual value in

TABLE A-3. POPULATION AND *per capita* GNP

AREA 4: NORTH AFRICA AND THE MIDDLE EAST

	Population			Per capita GNP in dollars		
	1968	Annual	Forecast	1968	1980	
	(Thousands)	growth rate (Per cent)	1980 (Thousands)		Forecast A	Forecast B
<i>North Africa</i>						
Algeria	12,943	1.7	15,845	220	254	350
Egypt	31,693	2.6	43,159	190	280	280
Libya	1,803	3.7	2,788	1,412	1,628	1,813
Morocco	14,580	2.8	20,307	208	213	294
Sudan	14,770	2.9	20,818	110	130	154
Tunisia	4,920	2.2	6,389	225	322	339
Sub-total	80,709	2.6	109,306	213	272	311
<i>Middle East</i>						
Cyprus	622	0.9	693	704	885	1,217
Iraq	8,634	3.3	12,747	270	425	425
Israel	2,745	0.0	3,353	1,460	2,631	2,631
Jordan	2,103	3.2	3,069	263	474	474
Lebanon	2,580	2.6	3,513	515	676	744
Saudi Arabia	7,100	1.3	8,284	375	641	641
Syria	5,701	2.9	8,036	200	280	280
Yemen, People's Dem. Rep. of	1,195	2.2	1,552	240	410	410
Turkey	33,539	2.6	45,673	380	457	549
Sub-total	64,219	2.5	86,920	396	549	603
Total	144,928	2.5	195,226	294	395	441

Sources: As for table A-1.

1968 was calculated. Then the actual number of CV in use in 1968 was multiplied by this ratio in order to arrive at the forecast number in use in 1980.

Tables A-6 to A-10 show, for the developing countries in each area, the numbers of cars, CV and PSV in use on 1 January 1968 and the numbers forecast for 1 January 1980 according to the alternative assumptions.

Forecasts of new registrations of motor vehicles

The volume of new registrations has to exceed the growth in the number of vehicles in use in order to replace vehicles which are scrapped. In countries where statistics of new registrations and the number of vehicles in use are available on an annual basis over a lengthy period of time, it is possible to estimate indirectly the number of vehicles scrapped each year, to compare this series of numbers with the series of annual new registrations several years previously and

TABLE A-4. POPULATION AND *per capita* GNP

AREA 5: AFRICA SOUTH OF THE SAHARA

	Population			Per capita GNP in dollars		
	1968 (Thousands)	Annual growth rate (Per cent)	Forecast 1980 (Thousands)	1968	1980	
					Forecast A	Forecast B
<i>Central Africa</i>						
Angola	5,362	1.5	6,411	120	141	195
Cameroon	5,562	2.4	7,394	168	193	248
Central African Rep.	1,488	2.4	1,978	125	144	184
Chad	3,460	1.5	4,137	70	81	114
Congo	870	1.5	1,040	130	150	211
Gabon	480	1.5	574	580	669	941
Zaire	16,730	2.4	22,239	79	93	128
Sub-total	33,952	2.1	43,773	109	127	172
<i>Eastern Africa</i>						
Botswana	611	3.0	871	100	120	138
Burundi	3,406	2.0	4,319	50	61	77
Ethiopia	24,212	1.5	28,950	65	91	105
Kenya	10,209	2.9	14,390	126	126	169
Madagascar	6,500	2.4	8,640	120	138	177
Malawi	4,270	2.4	5,696	58	58	86
Mauritius	787	2.9	1,109	220	251	308
Mozambique	7,274	1.5	8,698	100	140	162
Reunion	426	2.9	600	650	749	909
Rwanda	3,405	2.9	4,799	40	46	56
Somalia	2,670	2.9	3,869	72	83	91
Swaziland	395	2.9	557	180	217	252
Tanzania, United Rep. of. .	12,590	2.9	17,746	76	90	106
Uganda	8,133	2.9	11,463	96	113	134
Zambia	4,080	2.9	5,751	316	442	442
Sub-total	88,968	2.3	117,458	98	130	250
<i>West Africa</i>						
Dahomey	2,571	3.0	3,665	80	93	111
Gambia	350	1.8	434	110	129	173
Ghana	8,376	2.9	11,806	238	280	333
Guinea	3,795	2.9	5,349	120	141	168
Ivory Coast	4,100	2.4	5,450	304	350	403
Liberia	1,130	1.5	1,375	225	271	365
Mali	4,787	2.4	6,363	90	104	133
Mauritania	1,120	1.5	1,339	140	161	227
Niger	3,806	3.0	5,425	90	104	125
Nigeria	62,650	2.4	83,281	80	112	118
Senegal	3,685	2.4	4,898	225	259	332
Sierra Leone	2,475	1.5	2,959	153	184	248
Togo	1,769	3.0	2,522	125	144	173
Upper Volta	5,175	2.4	6,879	50	58	74
Sub-total	105,789	2.3	141,745	112	142	162
Total	227,474	2.3	302,976	107	135	197

Sources: As for table A-1.

TABLE A-5. POPULATION AND *per capita* GNP

AREA 6: OCEANIA

	Population			Per capita GNP in dollars		
	1968	Annual	Forecast	1968	1980	
	(Thousands)	growth rate (Per cent)	1980 (Thousands)		Forecast A	Forecast B
Fiji Islands	505	3.2	737	334	371	453
New Caledonia.....	95	2.6	129	1,600	1,864	2,311
New Guinea	1,680	2.6	2,288	170	198	246
French Polynesia.....	100	2.5	134	1,200	1,574	1,752
Total.....	2,380	2.7	3,288	305	358	435

Sources: As for table A-1.

thus to estimate how long vehicles last. In a few developed countries special surveys have been carried out using sampling techniques, in order to learn something about the age distribution of vehicles as well as the average lifetime before they are scrapped.

It is possible on the basis of these studies to construct a formula relating new registrations to the forecast increase in the number of vehicles in use and to the new registrations in the past. This method, however, is not appropriate to the developing countries. In the first place, the existing practice is to keep vehicles in use for a longer period than in the developed countries. Secondly, it is frequently the case that reliable statistics of vehicle registrations do not exist for some of the past years for which this information is required in order to apply the formula.

The studies show that in the developed countries the average lifetime of cars before they are scrapped is about twelve years and of CV and PSV about sixteen years. These may be regarded as normal relationships which the developing countries could perhaps endeavour to achieve by 1980. As simplifying assumptions it may be supposed that all cars first registered before 1968 and none of the cars first registered during the years 1968 to 1979 are scrapped by 1 January 1980. Similar assumptions are made for CV and PSV, substituting 1964 for 1968. It is then approximately true that the total of new registrations required in the eleven years 1969 to 1979 can be expressed in terms of the number of vehicles in use on 1 January in three given years. The formula is

$$P_{80} - P_{69} + P_{68} \text{ for cars, and}$$

$$P_{80} - P_{69} + P_{64} \text{ for CV and PSV}$$

where P_t is the number of vehicles in use on 1 January of year t .

Assuming that new registrations increase at 10 per cent per annum, the number in 1979 will be 13.9 per cent of the total for the eleven years 1969 to 1979, for which an approximate formula has just been given. This formula always overstates the eleven-year total, however: the excess is equal to the number of vehicles scrapped in certain years (1968 for cars and 1964-1968

TABLE A-6. CARS, CV AND PSV IN USE
AREA 1: THE CARIBBEAN AND LATIN AMERICA
(Thousand units)

	Cars			CV and PSV			Total Motor vehicles		
	1968	Forecast A 1980	Forecast B 1980	1968	Forecast A 1980	Forecast B 1980	1968	Forecast A 1980	Forecast B 1980
<i>The Caribbean and Central America</i>									
Costa Rica	21.7	56.1	60.9	27.2	28.8	31.5	48.9	84.9	92.5
Dominican Rep.	36.5	70.0	70.0	20.6	29.4	29.4	57.1	99.4	99.4
El Salvador	27.4	64.9	64.9	25.9	27.0	27.0	53.3	91.9	91.9
Guatemala	39.0	81.4	96.8	24.8	41.7	43.2	63.8	123.1	140.0
Haiti	7.5	9.4	22.8	1.0	1.2	2.0	8.5	10.6	24.8
Honduras	14.6	25.6	35.3	15.0	26.6	31.8	29.6	52.3	67.0
Jamaica	62.9	106.7	125.4	17.6	27.4	31.6	80.5	134.1	157.0
Mexico	976.0	1,886.7	1,886.7	471.4	934.0	934.0	1,447.4	2,820.8	2,820.8
Nicaragua	22.7	40.3	41.7	8.8	20.1	20.4	31.4	60.4	62.1
Panama	37.1	95.1	95.1	12.6	27.2	27.2	49.7	122.2	122.2
Trinidad and Tobago	70.9	142.6	142.6	18.9	32.3	32.3	89.9	174.9	174.9
Sub-total	1,316.2	2,579.0	2,642.3	643.7	1,195.7	1,210.4	1,960.0	3,774.7	3,852.7
<i>South America</i>									
Argentina	1,240.0	1,662.7	2,428.4	691.0	939.2	1,347.4	1,931.0	2,601.9	3,775.8
Bolivia	28.2	43.1	55.3	20.0	32.1	39.1	48.3	75.2	94.4
Brazil	1,813.0	2,540.0	2,791.5	1,045.8	1,710.9	1,926.3	2,858.8	4,250.9	4,717.8
Chile	111.4	239.6	294.9	116.8	198.5	230.8	228.2	438.1	525.7
Colombia	139.1	283.5	361.7	125.2	198.6	229.4	264.3	482.1	591.1
Ecuador	23.0	42.0	55.5	35.5	53.9	63.2	58.5	96.0	118.7
Paraguay	13.0	18.4	29.5	12.6	15.7	19.9	25.6	34.1	49.4
Peru	201.5	378.7	378.7	122.6	254.6	254.6	324.0	633.3	633.3
Uruguay	126.1	170.5	259.7	84.6	109.8	166.1	210.7	280.3	425.8
Venezuela	460.7	810.2	810.2	193.4	318.6	384.1	654.1	128.8	1,194.2
Sub-total	4,156.0	6,188.8	7,465.2	2,447.6	3,831.9	4,660.9	6,603.6	10,020.7	12,126.1
Total	5,472.3	8,767.7	10,107.6	3,091.3	5,027.7	5,871.3	8,563.6	13,795.4	15,978.9

Source (1968 data): Automobile Manufacturers Association Inc., Detroit.

TABLE A-7. CARS, CV AND PSV IN USE
 AREA 2: SOUTH-EAST ASIA
 AREA 3: THE REST OF ASIA, EXCLUDING THE MIDDLE EAST
 (Thousand units)

	Cars			CV and PSV			Total motor vehicle		
	1968	Forecast A 1980	Forecast B 1980	1968	Forecast A 1980	Forecast B 1980	1968	Forecast A 1980	Forecast B 1980
Area 2									
Burma	30.0	53.5	78.6	34.4	48.2	61.2	64.4	101.8	139.8
Indonesia	189.7	243.1	444.7	108.9	148.3	227.0	298.6	391.5	671.7
Khmer Republic	23.5	42.9	48.2	15.3	19.3	21.2	38.8	62.1	69.4
Laos	10.6	14.4	16.0	3.4	5.5	6.1	14.0	19.9	22.1
Malaysia	200.5	399.6	401.4	68.7	120.1	120.3	269.1	519.7	521.6
Philippines	204.0	323.2	423.8	148.3	304.0	365.4	352.3	627.2	789.2
Singapore	126.5	189.9	194.7	29.6	51.6	54.8	156.1	241.5	249.5
Thailand	131.6	291.6	291.6	120.8	252.6	252.6	252.4	544.2	544.2
Viet-Nam, Rep. of	45.6	124.1	131.6	45.9	81.3	85.5	91.5	205.4	217.0
Sub-total	961.9	1,682.4	2,030.6	575.4	1,030.9	1,194.0	1,537.3	2,713.3	3,224.6
Area 3									
Afghanistan	9.1	28.9	39.9	9.3	16.4	19.3	18.4	45.3	59.3
Ceylon	84.7	122.2	145.0	39.5	72.6	91.7	124.2	194.8	236.7
Hong Kong	64.6	140.8	140.8	23.4	44.4	44.4	88.0	185.2	185.2
India	480.0	870.5	1,323.2	402.0	660.5	788.5	882.0	1,511.1	2,111.7
Iran	192.1	369.1	369.1	69.6	121.0	120.9	261.6	490.1	490.1
Korea, Rep. of	26.1	127.3	127.3	31.7	76.5	76.5	57.8	203.9	203.9
Nepal	3.6	11.9	19.1	1.6	2.5	3.0	5.2	14.3	22.1
Pakistan	145.6	372.9	432.5	90.1	136.1	144.8	235.7	509.5	577.3
Sub-total	1,005.8	2,043.6	2,596.9	667.2	1,130.0	1,289.1	1,672.9	3,154.2	3,886.3
Total	1,967.7	3,726.0	4,627.5	1,242.6	2,160.9	2,483.1	3,210.2	5,867.5	7,110.9

Source (1968 data): As for table A-6.

TABLE A-8. CARS, CV AND PSV IN USE
 AREA 4: NORTH AFRICA AND THE MIDDLE EAST
 (Thousand units)

	Cars		CV and PSV		Total motor vehicles	
	1968	Forecast A 1980	1968	Forecast A 1980	1968	Forecast A 1980
North Africa						
Algeria.....	104.1	155.3	84.5	114.7	188.6	270.1
Egypt.....	111.8	392.7	32.8	62.9	144.5	455.6
Libya.....	77.3	136.6	35.2	53.6	112.6	190.2
Morocco.....	191.0	257.9	73.6	101.1	264.6	359.0
Sudan.....	27.4	58.3	26.1	42.2	53.5	100.5
Tunisia.....	65.2	113.7	21.4	61.6	86.6	175.3
Sub-total.....	576.7	1,114.6	273.7	436.1	850.4	1,550.6
Middle East						
Cyprus.....	43.0	50.6	15.1	19.8	58.1	70.4
Iraq.....	61.3	214.1	43.2	86.4	104.5	300.5
Israel.....	110.3	464.6	57.2	155.1	167.4	619.8
Jordan.....	17.0	66.0	8.5	20.4	25.5	86.4
Lebanon.....	123.8	188.6	15.8	26.7	139.7	215.3
Saudi Arabia.....	76.3	218.7	69.0	106.7	145.2	325.4
Syria.....	30.5	82.8	16.8	29.3	47.3	112.1
Turkey.....	93.3	411.1	131.9	182.5	225.2	593.6
Yemen, People's Dem. Rep.	18.2	37.2	4.7	8.5	22.9	45.8
Sub-total.....	573.7	1,733.8	362.1	635.4	935.9	2,369.2
Total.....	1,150.5	2,848.3	635.8	1,071.5	1,786.3	3,919.8
						4,655.0

Source (1968 data): As for table A-6.

TABLE A-9. CARS, CV AND PSV IN USE
AREA 5: AFRICA SOUTH OF THE SAHARA
(Thousand units)

	Cars			CV and PSV			Total motor vehicles		
	1968	Forecast A 1980	Forecast B 1980	1968	Forecast A 1980	Forecast B 1980	1968	Forecast A 1980	Forecast B 1980
<i>Central Africa</i>									
Angola	31.1	40.4	56.4	40.2	55.2	77.7	71.3	95.6	134.1
Cameroon	22.0	33.3	52.5	25.7	37.8	48.7	47.7	71.1	101.2
Central African Rep.	5.5	8.1	11.7	8.3	10.3	14.9	13.9	18.4	26.5
Chad	3.5	8.3	12.0	6.4	8.6	12.6	9.9	16.9	24.6
Congo	7.2	9.2	11.5	5.8	7.5	10.8	13.1	16.6	22.3
Gabon	4.7	8.6	17.5	8.1	6.6	9.6	12.8	15.3	27.1
Zaire	46.1	73.4	111.2	26.2	38.8	50.3	72.3	112.1	161.5
Sub-total	120.2	181.2	272.8	120.8	164.8	224.4	241.0	346.0	497.2
<i>Eastern Africa</i>									
Botswana	2.7	4.5	5.3	2.3	4.1	4.6	5.0	8.6	9.9
Burundi	3.1	6.0	9.1	1.4	2.2	3.0	4.5	8.2	12.0
Ethiopia	32.3	69.5	89.7	13.3	20.8	24.1	45.6	90.3	113.8
Kenya	82.7	115.4	145.3	23.5	27.3	38.7	106.2	142.7	184.0
Madagascar	42.9	60.5	76.0	29.3	43.0	55.8	72.2	103.5	131.9
Malawi	8.9	14.2	22.1	6.4	7.9	12.1	15.3	22.1	34.3
Mauritius	12.3	19.4	22.2	3.2	4.9	6.1	15.4	24.3	28.3
Mozambique	44.4	74.8	83.5	30.9	56.9	64.3	75.4	131.7	147.8
Reunion	16.1	22.7	27.8	6.8	11.3	14.0	22.9	34.0	41.8
Rwanda	3.2	4.8	6.7	1.1	2.1	2.7	4.4	6.9	9.4
Somalia	4.9	7.2	10.0	0.8	1.2	2.1	5.7	8.4	12.1
Swaziland	4.1	6.6	6.9	5.8	4.8	5.6	9.9	11.4	12.5
Tanzania,									
United Rep. of ..	30.5	49.7	62.1	35.3	55.4	65.7	65.8	105.1	127.8
Uganda	35.5	56.2	67.6	11.0	10.2	12.2	46.5	66.4	79.8
Zambia	50.0	71.4	71.4	13.1	19.2	19.2	63.1	90.6	90.6
Sub-total	373.7	582.9	705.8	184.3	271.3	330.0	558.0	854.2	1,035.9

	1968	12.8	15.8	5.9	9.2	11.3	16.0	22.0	27.0
<i>West Africa</i>									
Dahomey	10.1	12.8	15.8	5.9	9.2	11.3	16.0	22.0	27.0
Gambia	1.7	2.9	3.4	2.2	3.2	4.3	4.0	6.1	7.7
Ghana	29.0	70.8	101.5	21.5	41.4	49.3	50.5	112.2	150.9
Guinea	14.3	25.1	31.6	8.7	14.5	17.5	22.9	39.7	49.0
Ivory Coast	43.9	63.2	77.9	26.8	39.5	51.3	70.8	102.7	129.3
Liberia	10.6	13.2	18.9	9.1	8.1	10.7	19.6	21.4	29.6
Mali	5.6	11.5	19.7	5.6	8.8	11.7	11.2	20.2	31.4
Mauritania	1.7	3.2	7.4	2.8	3.9	5.7	4.5	7.1	13.1
Niger	3.3	7.6	12.5	5.1	4.1	5.2	8.4	11.7	17.7
Nigeria	89.6	229.0	258.2	44.0	64.9	69.3	133.6	293.9	327.5
Senegal	33.6	48.5	64.7	18.8	27.5	35.5	52.5	76.0	100.2
Sierra Leone	19.1	23.1	28.4	7.6	10.4	14.3	26.7	33.5	42.7
Togo	1.0	3.5	7.1	0.4	0.7	0.8	1.5	4.2	7.9
Upper Volta	4.9	8.9	13.8	5.3	7.8	10.4	10.3	16.8	24.1
Sub-total	268.5	523.5	660.7	163.9	244.0	297.4	432.4	767.4	958.1
Total	762.4	1,287.5	1,639.4	468.9	680.1	851.8	1,231.4	1,967.6	2,491.2

Source (1968 data): As for table A-6.

TABLE A-10. CARS, CV AND PSV IN USE
AREA 6: OCEANIA
(Thousand units)

	Cars			CV and PSV			Total motor vehicles		
	1968	Forecast A 1980	Forecast B 1980	1968	Forecast A 1980	Forecast B 1980	1968	Forecast A 1980	Forecast B 1980
Fiji Islands	8.2	16.2	22.1	4.3	6.0	7.7	12.4	22.2	29.8
New Caledonia	12.5	18.7	24.0	6.3	9.7	12.6	18.8	28.4	36.6
New Guinea	12.9	21.7	29.7	9.4	13.8	17.7	22.3	35.5	47.4
French Polynesia	10.1	18.0	20.4	4.0	7.3	8.1	14.2	25.3	28.5
Total	43.8	74.6	96.2	24.0	36.8	46.1	67.7	111.4	142.3

Source (1968 data): As for table A-6.

for CV and PSV). These magnitudes are unknown but may result in an overstatement of roughly 10 per cent in the eleven-year total. This leads to a similar overstatement of the new registrations assumed for 1979. To take account of the margins of error in basic statistics and in the assumptions used, it was decided to regard the new registration estimates as applying to 1980 rather than 1979.

It may be thought that 10 per cent is a modest annual growth rate for new registrations, but there are many factors involved which suggest that it may be a realistic one for developing countries.

It is obviously of national interest for a developing country to limit new registrations and hence the growth in the number of vehicles in use, because this makes possible:

Gradual establishment of a road network suitable for motor vehicle traffic which, in most cases, is non-existent in rural areas and in poor condition in the towns;

Establishment of a fuel marketing network having supply points closely enough spaced to meet vehicle needs;

Gradual establishment of vehicle maintenance and repair workshops throughout the territory;

Training of mechanics to carry out this work;

Driver training and the inculcation of road discipline, which is indispensable if the number of accidents is to be kept within tolerable limits.

In addition, it must be regarded as inevitable that new registrations will be limited to the output from domestic production, wherever that exists. In such cases, the choice of too high a growth rate will create many difficulties and, in particular, is almost bound to bring about a decline in product quality as a result of the introduction of unskilled and untrained labour into the production cycle. It is important to avoid this mistake since in many of the countries concerned neither management nor labour has a tradition of industrial production.

Obviously the assumption of any common growth rate is a simplification which is justified only by the general nature of this study. The appropriate percentage should be decided for each country, making use of a thorough market survey, carried out on the spot, to evaluate possibilities, requirements and wishes through direct contact with the population.

The targets for the annual percentage growth of new registrations and vehicles in use should be fixed in the light of the survey. They should be agreed with the Government, in the context of the industrialization plan.

The margins of error in the forecasts

The forecasts of the number of vehicles in use and of new registrations have been calculated to the nearest unit, not rounded off to the nearest ten, one hundred or one thousand vehicles. The reader must be warned against assuming that this carries any implications about the accuracy of the forecasts.

At every step in the method by which these forecasts were obtained there is a potential source of error.

The basic statistics

While the most recent and reliable statistics have been used, they are subject to reservations. In many developing countries the conduct of a population census is fraught with difficulties and the errors of omission or duplication were generally not of similar magnitude in successive censuses. "Growth rates of population often calculated from two distant and not comparable bench-mark years may be inaccurate by as much as 50 per cent."¹

Gross National Product may be a relatively simple concept but the practical difficulties of estimating it, particularly in the least developed countries, are very great indeed owing to the lack of certain basic statistics and of the means of remedying this situation. The margin of error is likely to be much greater in the estimated size of GNP in any particular year than in its growth rate over a period of time. The method used to forecast vehicle demand makes use of both GNP and its rate of growth.

Statistics of the number of motor vehicles in use are based, in the final analysis, on the vehicle licensing activities of public authorities in the various countries. Certain categories of vehicles are not subject to licensing in some countries, for example, military vehicles. Non-licensed vehicles are not always included in the statistics of the number in use. A further reason for understatement of the number in use may be the failure of some vehicle owners to renew the licences annually while continuing to use the vehicles.

Choice of growth rates

For population it has been assumed that the average growth rate in the recent past (itself subject to statistical error) will also be applicable in the period up to 1980. The same assumption has also been made with regard to GNP under the first alternative. There are evidently many possible ways in which this assumption could prove false: As far as population is concerned, both death rates and birth rates may be expected to decline, but some of the factors involved do not affect both rates. As regards the GNP, since the object of the United Nations Second Development Decade is to accelerate the past rate of growth, the figures used for alternative A may be considered somewhat pessimistic.

For the developing countries as a whole, the average annual growth rate assumed is 2.4 per cent for population and 5 per cent for GNP. The cumulative effect by 1980 of an error in these assumptions is likely to be rather significant. For example, if the population growth rate is 2.7 instead of 2.4 per cent then the population in 1980 will be 3.5 per cent larger. Similarly, if the growth rate of GNP is 6 instead of 5 per cent, then GNP in 1980 will be 11.5 per cent larger. If population and GNP are both overestimated or both underestimated, the

¹ OECD Development Centre, *National Accounts of Less Developed Countries, 1950—1966* (Reference Number CD/R/MA.3), page 37.

margin of error in *per capita* GNP (which is used in forecasting the number of cars and PSV) will be of a magnitude intermediate to the margins of error in these two parameters (in the same or the opposite direction). If, however, one parameter is underestimated and the other overestimated, the margin of error in *per capita* GNP will be approximately the sum of the two margins of error.

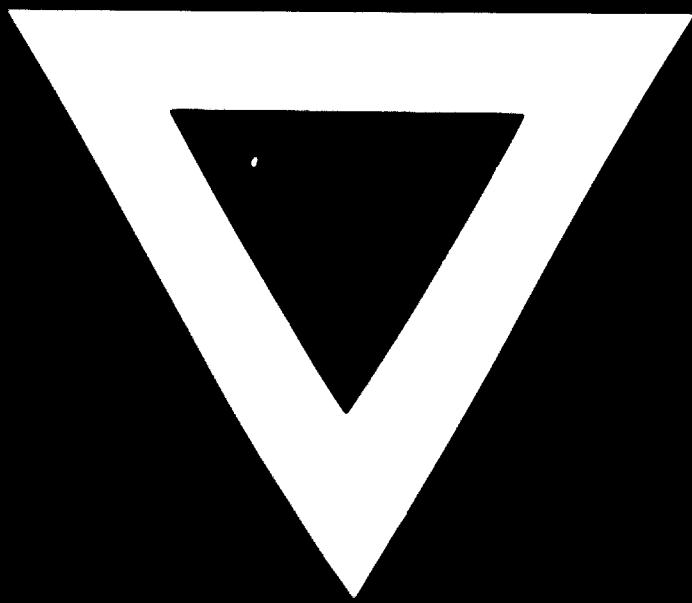
Correlation of number of vehicles in use with GNP and per capita GNP

In view of the doubtful quality of some of the basic statistics, it was not thought appropriate to use sophisticated methods when forecasting the vehicle densities for 1980 on the basis of a correlation with the forecast GNP or *per capita* GNP in that year. By grouping the developing countries into areas where economic, social and geographical conditions are generally not too dissimilar, it is probable that the margins of error were reduced.

New registrations

Since the volume of new registrations depends on the number of vehicles scrapped as well as on the growth in the number in use, there is the risk that it has been overestimated by adopting too optimistic an attitude to the modernization of passenger and goods transport in many developing countries. As already mentioned, the approximate formula for deriving the new registrations from the number in use slightly overstates the requirements; on the other hand, the assumption that new registrations grow at 10 per cent annually should prove reasonably accurate for the developing countries as a whole, though not necessarily for particular countries.





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