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ECONOMIC PROSPECTS IN 1965. MANPOWER AND MANAGEMENT IN AN AUTOMATED AGE. SHORT-TERM FORECASTING: RAW MATERIALS FOR ECONOMIC POLICY MAKING. THEORY AND PRACTICE IN TRANSPORT ECONOMICS. THE INTELLECTUAL INVESTMENT IN AGRICULTURE



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SHORT-TERM FORECASTING:

raw material of economic policy making

For economic policy measures to be well directed and timely in their effects, they must be based on a careful and accurate assessment of the country's short-term prospects. The preparation of short-term economic forecasts has become an important part of economic policy, and in a number of countries in recent years there has been considerable development and improvement in the methods and techniques used.

Not all the governments which engage in forecasting publish the results. Still fewer have made public detailed accounts of the methods they use. OECD's Economic Policy Committee thought that such accounts would be useful; in a volume to appear shortly, entitled "Techniques of Economic Forecasting", the Governments of Canada, France, the Netherlands, Sweden, the United Kingdom and the United States explain how they carry out their forecasting. An introduction by Mr. C.W. McMahon of Magdalen College, Oxford, compares the approaches and draws some conclusions. The book is intended both for the professional forecaster and for the non-professional who wants to know something about the possibilities and limitations of forecasting.

Critics of economic forecasting have sometimes called it an exercise in quantifying the unquantifiable. Indeed, the difficulties involved in evaluating economic trends are not to be underestimated. Some economic variables fluctuate widely over the course of a business cycle. Canadian forecasters, for example, have found that profits may swing by as much as 30 per cent from peak to trough and imports by 25 per cent. For a country which depends greatly on foreign trade, predicting developments in the nations with which it has trading relations is of crucial importance. Moreover, some events — a bad winter, for example — are inherently unforeseeable.

Nevertheless, forecasters have been making progress in the development of their science, and the area of uncertainty is being reduced.

More Statistics

The range of statistics on which forecasters may draw has been vastly enlarged in the years since the war. Not only are there data available on a greater

number of variables, but collection is more frequent and refinements such as seasonal adjustment of quarterly data are more wide-spread.

Since the policy maker's picture of "today" is in fact based on statistics from "yesterday", it is very important to the forecaster that the time-lag between an event and the availability of statistics describing it be as short as possible. Here too there has been progress. In the United States, quarterly data for all the main components of national income and expenditure are available (at least in preliminary form) within six weeks after the end of the period covered. In Sweden a quarterly survey of business trends in 17 sectors is published two weeks after the questionnaires have been collected.

The Survey as a Symptom

The trends shown by such statistics can be extrapolated into the future. But quantitative forecasting today goes far beyond the simple projection of past trends. Forecasters have carefully studied the various

economic variables and the relationships between them. These interrelations from the past can be used to illuminate the future. As an example, in almost all the countries, personal consumption can be related (sometimes in a complex way) to disposable income.

In many cases the relationships observed have been causal, and insofar as this is so, the forecasters can be said to have contributed to an understanding of how their economies work.

But many of the interrelations that have proved useful in forecasting are not causal in nature; much of forecasting today is based on "symptomatic" or "barometric" data, a great range of which has been collected in recent years. This "symptomatic" data is of two sorts — the survey of anticipations and so-called "pre-flow" data. The anticipations survey is intended to sound out people's own expectations of what will happen. Governments now take sample surveys (or use those of private institutions) to find out what businessmen expect to invest, what consumers expect to spend.

Some of these surveys are very sophisticated. Businessmen in France, for example, are asked not only how much they expect to invest in a given period but also how much they plan to invest with a particular degree of certainty, what circumstances might lead them to invest more, and how much more. As a result of this survey, forecasters are not left with a simple figure for future investment based strictly on businessmen's expectations. They are also given the means for adjusting the figure to coincide with other elements in the forecast or to take account of changed circumstances.

In the US businessmen are asked not only how much they plan to invest but also what they expect in the way of sales. The sales expectations figures seem to have no predictive value in themselves, but they are used to adjust the investment expectations: by analysing statistics going back to 1948, the forecasters have found that for each one per cent that actual sales exceed businessmen's expectations, actual investment has exceeded anticipated investment by 1.1 per cent (on the average). Knowing this, the forecaster can replace the manufacturers' sales forecasts with his own and adjust the investment figure accordingly.

In some countries consumers are asked what they intend to spend on cars and other consumer durables in the near future. In France, a sample of 8,000 families are also asked about their plans for buying clothing and footwear, and their expectations as to income.

"Pre-flow" data are the orders, contracts and commitments that precede the actual flow of goods and services. Housing starts, for example, are used to give an indication of how much construction will be completed in a future period. A wide variety of such data has been developed. In the United Kingdom, for example, the Government makes use of figures

collected by the Royal Institute of British Architects showing the amount of work on architects' drawing boards.

Inevitably some of the statistics collected have proved to be of little value in forecasting. Housing vacancy rates, compiled in the US since the mid-1950s, have not been of much help in forecasting the demand for new housing. Similarly, statistics on mortgage applications have been a rather erratic gauge of the housing market.

Forecasters also make use of qualitative information. Talking to union leaders and industrialists will give them some idea of what wage increases are to be expected. In the US, since housing activity for the nation as a whole is the sum of so many diverse local markets, the forecasters attach considerable importance to the views of industry specialists.

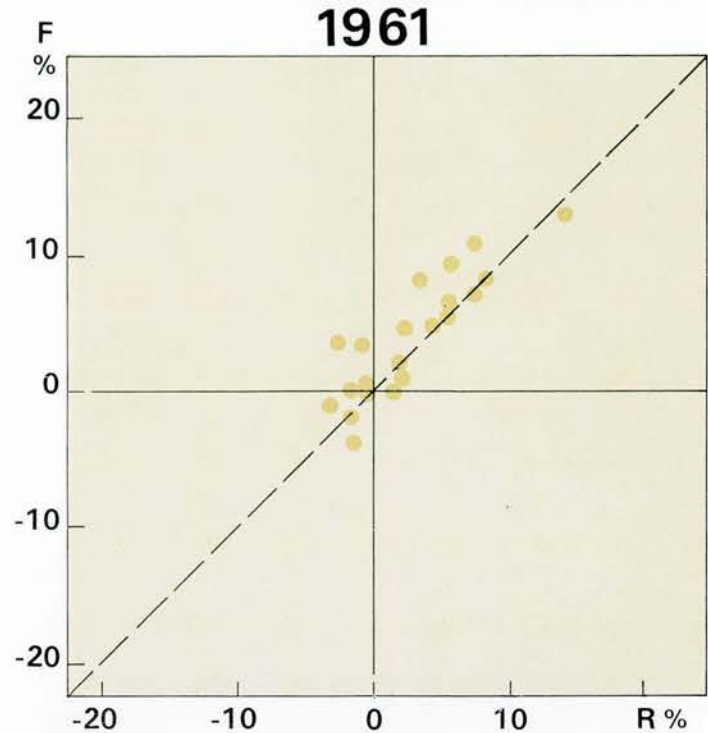
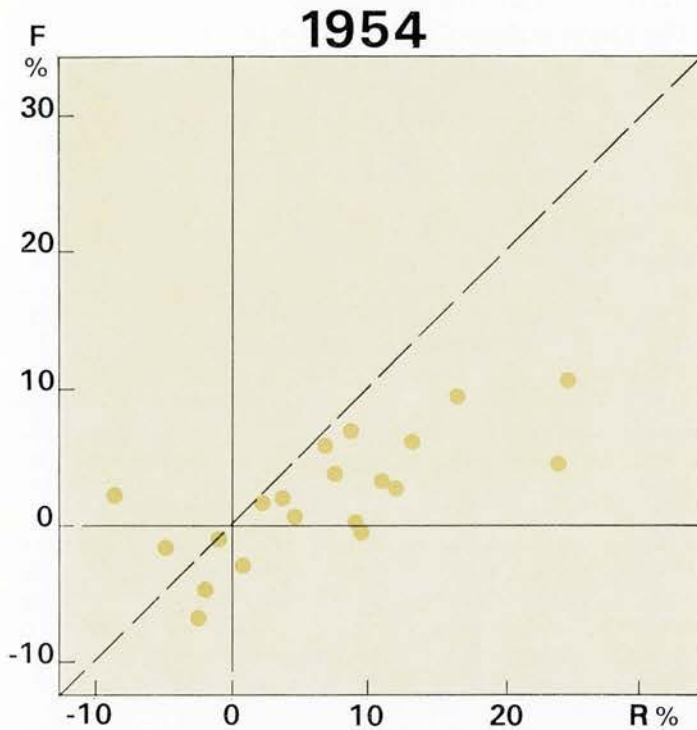
An Economy in 60 Equations

Some of the countries have developed a series of equations which, with the help of high-speed computers, can be solved to yield a picture of the economy as a whole or of some sectors. This "econometric model" may be used as the primary tool of forecasting, as in the case of the Netherlands, or as a cross-check on more eclectic methods to ensure that the various elements in the forecast are consistent one with another. They are also used to test the accuracy of the forecast against the economy's actual performance. Such models have been greatly refined within the last few years. The first model constructed in Canada (in 1947) consisted of only 11 equations; the one presently in use comprises 60, and work is going on to improve it further. (The current model has been found to overstate price changes.)

In the Netherlands, where econometric models have been constructed since 1936, recent models have been more dynamic than earlier ones and have incorporated non-linear relationships. Testing has shown that there is less discrepancy between forecast and actuality than there used to be. (See diagram.)

Other countries too can point to progress in the accuracy of their forecasts. The average error in US forecasts in the past two years has been about \$ 3 billion for one quarter ahead. US forecasters note that "This may not appear as a dramatic improvement over a naive trend forecast, which in the post-Korean period would have displayed an average error of a little less than one per cent of GNP or about \$ 5 billion at current levels. On the other hand, the one-quarter forecast looks rather good when it is recognised that the first historical estimate by the Department of Commerce after the end of the quarter still shows an average error of about \$ 2 billion when compared with the quarterly changes ultimately shown by revised data."

THE DISCREPANCY BETWEEN FORECAST (F) AND ACTUAL (R) CHANGES IN ECONOMIC ACTIVITY. THE NETHERLANDS, 1954 AND 1961.



The points represent the various elements of the forecast. The diagonal line represents complete equality between the forecast and what actually happened. Thus the distance of the points from the diagonal line represents the discrepancy between forecast and actuality. It can be seen that the cluster around the diagonal line was closer in 1961 than in 1954.

The Knottiest Problems

Despite the improvements, forecasters are by no means complacent. Enormous problems still face them, not the least of which are the difficulties involved in testing the accuracy of their predictions. Since the purpose of official forecasts is not so much to predict the future as to guide policy, it is quite likely that by the time the moment for testing comes, the policies assumed by the forecast to be constant will have changed. In such a case the falsification of the forecast provides its very *raison d'être*. Even without a change of policy, testing is difficult. A forecast can be right for the "wrong" reasons; that is, there may be compensating errors.

Most countries appear to be reasonably satisfied with their ability to foresee increases in wage rates and prices, the trend rate of productivity growth, and, somewhat less confidently, public expenditures and imports. But forecasts of stock building, an important part, quanti-

tatively, of any forecast, leave much to be desired. To begin with, statistics about past developments are weak. Moreover, no completely satisfactory relationships with other variables have yet been found. It seems clear that stock building must be explained in terms of ratios between stocks and sales, but to date the precise way to use such ratios has not been found.

Concludes Mr. McMahon: "Most forecasters would probably agree that the most difficult and important part of their job is not estimating by means of established relationships what is going to happen tomorrow, but really understanding where the economy is and what is happening in it today. This is a matter of how good the figures actually are, what meaning can be given to them, how likely they are to be revised, how they may best be reconciled when they yield conflicting implications and so on. Thus the most important source of further improvements in the countries concerned is probably the improvement and development of statistics."

A NEW APPROACH IN ANALYSING THE IMPACT OF AID

The present article summarises the result of an OECD enquiry into the efficacy of foreign technical assistance in helping Greek development (1). This study was prepared with the intention of being a prototype for future country reviews. Technical assistance from bilateral donors and international organisations is now running at the rate of \$ 1 billion a year for developing countries as a whole, and many governments and international agencies have become interested in measuring its impact. The Greek study was the first systematic attempt to do this. The Development Centre of OECD is now conducting a study on these lines for several non-Member countries, the OECD Development Department intends to do something similar for other Southern European countries and the United Nations intends to review its programmes in five countries in similar fashion.

Greece gets less than \$ 2 million a year in technical assistance, mainly from Germany, the UN agencies, and OECD. This is a modest effort by comparison with some other parts of the world. In some African countries, technical assistance is massive. In Tanganyika, for instance, 94 per cent of high level manpower is non-African, and yet even so the high-level manpower is only 0.1 per cent of the labour force. In Greece the situation is quite different. High-level manpower is 2.8 per cent of the labour force and only a tiny fraction — 0.5 per cent — consists of foreigners. However, as far as training is concerned, Greece is much more dependent on the outside world than one would expect from its general level of development. More than a quarter of Greeks getting higher education are studying abroad. This is a higher proportion than in any country outside Africa except Iran.

In some fields therefore foreign skills and training are marginal in Greece, in others they are very important. One can only judge their impact by looking at the whole manpower and education picture in Greece, both domestic and foreign. This macro-economic manpower approach is a new one in technical assistance evaluation, which has hitherto been done on a more subjective basis by looking at isolated projects or studying an individual donor country's aid programme. This new aggregative approach to technical assistance analysis was greatly facilitated by the existence of a detailed plan for Greek education needs in relation to economic growth, which had been prepared with help from OECD.

Technical assistance is of two main types — first, it can help plug gaps in a country's skills by supplying experts; secondly, it can help to train people in new skills and build up local training institutions. The first type of help meets pressing short-term needs, the second kind of help is the only sound way of helping in the long term. In Greece technical

TECHNICAL ASSISTANCE AND THE ECONOMIC DEVELOPMENT OF GREECE

by Angus MADDISON
OECD Development Centre

(1) *Technical Assistance and the Economic Development of Greece*, by Angus Maddison, Alexander Stavrianopoulos and Benjamin Higgins, to be published by the OECD Development Centre during 1965.



Students of the American School of Agriculture in Salonika.

assistance has been successful in the first respect, but has had only a partial success in the second.

Technical assistance is not costless. Greece has itself contributed financially to UN and OECD programmes, and pays a 15 per cent partnership contribution to German bilateral assistance. It pays local expenses to experts and travel for students. Even more important is the manpower cost to Greece in absorbing foreign experts who may need to be briefed by many senior officials or ministers, and whose missions require organisation by scarce Greek managerial talent. Similarly, study abroad takes officials from many key jobs and is sometimes followed by emigration so that the ultimate benefit may be derived by the country providing scholarships. For this reason, the efficient use of technical assistance is just as important to recipient as to donor countries.

THE NATURE OF THE GREEK ECONOMY

Greece may be regarded as a country on the threshold of economic development. On almost any

of the usual criteria, Greece is on the borderline between the underdeveloped and the more advanced countries, but, on balance, still belongs in the former category. Greece is not desperately poor. The health of its people is good with life expectation of 66 years compared with 70 in the USA, 50 in Brazil or 27 in Mali. It has one doctor for every 800 inhabitants compared with one in 1,000 in France, one in 5,000 in India, and one in 77,000 in Mali. Nutrition is reasonable at 2,900 calories per person a day. Primary education is available to all and illiteracy is only 18 per cent of the population aged 10 or more. Total output grew at 6.2 per cent a year from 1951 to 1961 and output per employed person at 5.1 per cent — in both cases faster than any OECD country, except Germany and Japan. Greece has also had relative price stability since 1953.

On the other hand, real GNP per head is only a third of that in Germany and half of that in Italy, and the growth rate contains a large element of recovery, as pre-war GNP per head was only restored in 1956. Half of the labour force is still in agriculture, and natural resources are negligible. Unemployment is 6.5 per cent of the labour force, and there is large scale seasonal unemployment in agri-

culture. Regional differentials in productivity and per capita income are dramatic. The leading region is central Greece and Euboea, with Athens as its centre, and the lagging region consists of the rest of the country. Per capita income in the leading region is a third above the national average, and everywhere else it is lower. In Epirus it is only half the national average. Commodity exports are largely agricultural, and are stagnating through inelastic demand and falling prices, and Greece has to meet the challenge of joining the Common Market and eliminate its rather high tariffs over the next twenty years. Exports cover only 40 per cent of imports. A favourable balance on invisibles meets a good part of the trade deficit, because of large earnings from shipping, tourism and emigrant remittances, but a sound long-term position will require a big expansion of manufactured exports which are now only 9 per cent of the total.

Thus Greece has major problems of industrialisation and export promotion, and the Greek Government has heavy responsibilities for spreading modern technology. In this it is faced with major problems.

A major obstacle to the absorption of modern technology is the small scale of enterprise in both agriculture and industry. Successive land reform measures have practically abolished large scale land ownership. The average area per family farm is about 8 acres, but the average farm is split into 6.5 plots. Farm fragmentation is worse in Greece than any other European country. The majority of the labour force in manufacturing is employed in low-productivity small-scale plants. Here again the size of enterprises is smaller in Greece than in most countries. Only 27 per cent of Greek manufacturing employment is in firms with more than 50 employees, whereas in Brazil the proportion is 66 per cent, and even in Japan it is about half. Furthermore the size of the domestic market is an obstacle to Greek industrialisation as it is a country

of only 8.5 million people with rather poor transport facilities and low incomes.

The effort of Greece to achieve self-sustaining growth by mobilising its own resources has been highly successful when measured in an aggregative financial sense. In 1949, foreign grants were as high as 23 per cent of GNP, i.e., they covered most of investment and government current expenditure. Between 1949 and 1962 Greece received a net inflow of foreign capital (mostly US aid) of \$ 1,785 million, and military aid of \$ 970 million. However, by 1956-62 foreign grants represented only 1.2 per cent of GNP. Greek gross domestic savings rose from 7 per cent of GNP in 1949 to 18 per cent in 1962, and total tax revenues rose to 20 per cent of GNP in 1958-62. In this respect Greece is a model of what can be done for an economy by giving it enough aid to provide a "big push", and then withdrawing when the economy has acquired its own momentum.

THE CREATION OF NEW SKILLS BY FORMAL EDUCATION AND ON - THE - JOB TRAINING

We have suggested that the key role of technical assistance is to help build up local training institutions. But where does the priority lie? It lies in bigger and better facilities for training skilled workers and middle-level personnel and in improvements in the quality of higher education.

Greek primary education has been compulsory from the age of 6-11 inclusive and enrolment of this age group is virtually complete. About 90 per cent of children stay the full six years, and the Government have recently extended the compulsory phase to 9 years. In this respect, the Greek situation is very much better than most developing countries,

GREEK HIGHER EDUCATION

| GREEK STUDENTS | ENGINEERING AND ARCHITECTURE | MEDICAL AND DENTAL | AGRICULTURE AND VETERINARY | OTHER SCIENCES AND PHARMACEUTICAL | SOCIAL SCIENCE | LAW AND HUMANITIES | UNSPECIFIED |
|---------------------|------------------------------|--------------------|----------------------------|-----------------------------------|----------------|--------------------|-------------|
| IN GREECE 25,658 | 2,358 | 4,075 | 1,125 | 2,698 | 8,012 | 7,390 | — |
| ABROAD 8,157 | 4,127 | 1,422 | 373 | 678 | 346 | 211 | 1,000 |

even those which have similar overall levels of income such as Mexico or Brazil, where less than a fifth of children complete primary school. This is not a sector where foreign technical assistance has a significant role to play.

About 20 per cent of Greek children aged 10-19 attend secondary schools, which is quite a respectable figure. The syllabus in secondary schools has been changed to give students more option of studying scientific and technical subjects. OECD technical assistance has helped here with the training of physics teachers, and translations of textbooks in mathematics and physics, which is the most appropriate form of aid for general secondary education.

In terminal secondary education, the position is unsatisfactory. Most technical schools in Greece have part-time teachers and pupils, and instruction is largely theoretical due to lack of workshop facilities. There are only 500 trained vocational teachers in Greece, and the estimated need is for 2,000. At the moment they are being produced at the rate of 100 a year. The US, OECD and the UN Special Fund have all provided aid to Greek vocational training. It was as a result of OECD recommendations that a Vocational and Technical Teacher Institute was created in 1959. The US and OECD have been helping this for several years, and the UN Special Fund is helping to finance a new building and workshops for the Institute. German technical assistance has financed the training of about 400 middle level technicians in Germany for periods up to 2 years and intends to finance practical training schools in Greece.

All of this effort has been in the right direction, but the biggest lack has been in in-service training. Greek industrialists and trade unionists have not pushed this type of training which is often the most useful and cheapest way of producing skilled workers. Here of course the responsibility for action is largely one for the Greek authorities and they might well consider instituting financial incentives for industrial training or penalties for non-training such as the payroll tax and rebate system operated in Brazil to finance apprentice training. They could also make the availability of official credit conditional on appropriate in-service training arrangements. Within the government service itself there is need for a good deal more of in-service training, and OECD has helped to finance a new scheme for such training.

Agricultural education is also defective in Greece, consisting of ten practical farm schools giving courses of a year or two years, youth clubs, and regional centres with short courses of specialised training. Extension officers are an integral part of rural education, but 180 of the 500 posts in the extension services are vacant. Professor Arthur Lewis has suggested that developing countries should have 1 extension worker for every 1,000 persons working in agriculture. On this basis there should be 1,700 extension workers in agriculture instead of 320.

Greece has more doctors per head of population than the UK, but it has less than 1 nurse per doctor, whereas the UK has 5! Here again we see the typical shortage of middle-level manpower which plagues all developing countries — largely because

the social hierarchy is an extreme of rich and poor so that few people aspire to middle-level jobs. The World Health Organisation provided ten scholarships in 1956 to try to train people to set up a post-basic training school for nurses, but this was not followed up.

In higher education, Greece provides training for about 3.3 per cent of the age group 20-24. This is a reasonable enough figure for a country at this income level, but the main problem is that Greek higher education is of poor quality in several faculties, whilst in fields important for economic growth its capacity is limited. Only 20 per cent of Greek university students are studying scientific and technical subjects. Teaching salaries for professors are low, and many junior faculty members have no fixed income, so that university teaching is a part-time occupation. This sort of picture resembles that in many Latin American countries, but in Greece the ratio of students to faculty is 30 : 1 whereas in Mexico it is 8 : 1 and Brazil 4 : 1. Greek higher education is, therefore, in a worse state than that of practically any other country. It is worse than that of Latin America, and qualitatively much worse than that of many of the new African countries.

Unfortunately technical assistance has done very little to remedy this situation. One reason for this is that visiting professors do not usually speak Greek, and the knowledge of foreign languages by Greek students is rather poor. Foreign donors of aid have, therefore, reacted in the way which was easiest for them — they have provided scholarships for study abroad rather than helping higher education in Greece. In 1963, bilateral governmental programmes of OECD countries provided about 750 scholarships for study abroad of which about half were for higher academic education. On top of this there were private foreign scholarships and those of multilateral agencies.

For the past few years there have been 9,000 Greeks studying abroad as compared with about 25,000 at home. This foreign study has advantages for Greece in view of the deficiencies of her own universities. Two-thirds of those studying abroad are scientists and engineers and 10 per cent of them are post-graduate students who are acquiring skills of great value at rather a small financial cost to Greece. However, many of these students do not return to Greece. They take root in their country of study, and those of them who are potential university teachers naturally prefer to teach abroad rather than work in Greek conditions. Furthermore, the poor organisation of the Greek public service means that government jobs are unattractive from both a financial and a career viewpoint.

It is clear therefore that the Greek Government must make a major effort to change this situation and improve the quality of higher education. It is also clear that technical assistance donors should put less emphasis on helping Greeks to study abroad and try to do more to help training in Greece itself.

A major recommendation of the technical assistance review was therefore that the Greek authorities should create a new university which should try to establish completely new standards in Greece. It should have a full time teaching staff and should

be devoted entirely to scientific and technical fields and to economics where Greek education is weakest. It was not, of course, suggested that existing institutions be ignored, but the new institution should aim to act as a catalyst which would bring the other two universities to compete and raise their standards. International support for such an institution is vital, firstly because it would be a guarantee to the expatriate Greeks who need to be attracted back as teachers that the standards were really intended to be of high quality, secondly because Greece will need foreign technical help to build such an institution. The Greek authorities have in fact decided to proceed on these lines. A detailed project for the university has been prepared and an act of parliament has brought it into existence. It has also been suggested that the post-graduate school of the university should aim to be international, with students from outside Greece, and with post-graduate teaching in English or French. This would, of course, enable the university to absorb visiting professors much more easily than existing Greek institutions.

THE APPROACH OF DIFFERENT DONORS OF TECHNICAL ASSISTANCE

The review of Greece provided an opportunity to study in microcosm the approaches which different aid donors adopt in the developing world as a whole and it therefore throws light on policies which are followed in many other places.

United States technical assistance to Greece was tightly linked to its capital aid programme, and has been phased out now that capital aid has ended. It had major success in infrastructure investment. About half the high-level manpower employed in the energy sector was at one time supplied by the United States. It played a vital role in plugging a gap in Greek skills at a critical phase and has now been withdrawn. As far as local institutions are concerned, American aid helped a great deal in building the Productivity Centre, vocational training, the statistical service, the Public Power Corporation, the Public Health Service, and the Agricultural Extension Service. In higher education, many scholarships were provided for study abroad, though little was done to help domestic institutions of higher education. In this latter respect, US technical assistance still has unfinished business in Greece, for the Greek brain-drain has mainly benefited the US.

German technical assistance to Greece has helped to provide equipment for the Polytechnic in Athens. It has provided training places for middle-level technicians in Germany, and a substantial expenditure on pre-investment surveys which help to lay the basis for industrialisation. The emphasis in German aid to Greece has been typical of its programmes elsewhere.

French technical assistance is largely concentrated on Africa where it is run by the Ministry of Co-operation and the Ministry of Algerian Affairs. In other countries France usually offers cultural co-

operation through the scholarships of the Foreign Ministry, and high-level training or pre-investment surveys which are provided by the Ministry of Economic Affairs. The French programme in Greece has, therefore, been similar to those it runs in Latin America. In fact the French programme has largely been geared to Greek priority needs, except that the cultural programme might profitably have given even greater emphasis to science and technology. This is, of course, true of the cultural programmes of some other countries, including those of Germany.

British technical assistance to Greece has consisted entirely of the activities of the British Council, as the Department of Technical Co-operation did not give technical assistance to Greece. However, most British Council scholarships are in technical or scientific fields.

Several other countries have given bilateral technical assistance to Greece on a small scale, including Italy (mostly training), the Netherlands (including land reclamation and community development experts), Sweden, Switzerland and Israel.

All of the UN agencies have at some stage operated in Greece. The most successful have been the activities of the International Civil Aviation Organisation in building up aviation training. In the case of the International Labour Organisation, the Food and Agriculture Organisation, and WHO, there has been an inadequate follow-up by the Greek authorities of some projects which seemed promising. The United Nations Educational, Scientific and Cultural Organisation has created a Social Science Research Centre and an Adult Education Centre, and the International Atomic Energy Organisation has helped to promote atomic energy research. But none of these three projects corresponded to the most pressing Greek needs. The UN Special Fund has four major projects, three of which — in the field of water resources, forestry and teacher training — have met important Greek needs, but the survey team in the Western Peloponnese is too heavily concentrated on agriculture and not too well co-ordinated with Greek regional planning. Assistance provided by UN headquarters in statistics and geological research has been highly successful. In fact, the various UN programmes are not as well co-ordinated as they should be, and some of them have arisen more as a result of interest of the donor agency than as a response to Greek needs, but on the other hand, multilateral technical assistance has been able to be more imaginative than bilateral programmes in urging the Greek authorities to experiment in new lines. Some of their failures have been due to lack of adequate response, but some of their ideas were, of course, mistakes.

OECD gives technical assistance to Greece, as it does to five other Member countries in course of development, and Greece has been the biggest recipient. OECD programmes have had some of the problems of the UN programmes. They have not always been well co-ordinated, and ideas were pressed on the Greeks which were not always followed up or successful. OECD did have the advantage of knowing the Greek situation intimately as its programme is much more limited in total size than the world-wide UN programmes.



A course at the Technological Institute, Athens.

OECD has provided Greece with technical assistance in the form of general policy advice. It has helped with trade union training; the Productivity Centre; vocational training; educational planning; in several agricultural fields including marketing of fruits and vegetables; school building; repatriation of Greek scientists; secondary school science; handicrafts; and a pilot project in regional development. The trial and demonstration area in Epirus is an example of how much technical assistance can cost a recipient country. In this area the OECD cost in financing experts was about \$ 100,000, but Greece spent about \$ 4 million in the area on capital projects connected with the scheme, and investment was raised from 5 to 45 per cent of the income of the pilot zone. Nevertheless, this project was not a success. On the other hand, OECD schemes in agriculture, education and vocational training have had a high yield.

On the whole, the technical assistance effort in Greece has played a significant role in the successes achieved and in the fruitfulness of capital aid. There have been no cases of disastrous failure, and unsuccessful projects have usually been the results of imaginative efforts to do something new. Very many of the most valuable institutions in Greece have been created only because technical assistance was available. However, it is clear that technical

assistance must be directed with a view to the priority needs of economic development and not devoted to certain fields merely because the donor happens to have a particular interest in them. Equally, it can be dangerous to try to apply the limited resources of technical assistance to the poorest parts of the country in the spirit of a relief worker, as OECD did at Epirus. This approach ignores the fact that technical assistance has a cost to the recipient. If the priorities are not clear, technical assistance should try to aid the growing parts in the economy rather than try to sustain the stagnant ones.

Finally, the review recognised that Greek arrangements for co-ordinating and screening its technical assistance requests had been a major factor in the success of foreign aid. Other developing countries which want to get the best use out of their own and foreign manpower resources and training should also try to plan their allocation in relation to overall economic priorities. This is difficult to do with any precision as manpower and educational planning is still an underdeveloped art, but this is a field where a good deal can be achieved by sound commonsense and good organisation, provided that the government creates a technical assistance service to provide an overall view and negotiate with all aid donors.

ECONOMIC PROSPECTS IN 1965

At its first meeting at Ministerial level, in December 1961, the OECD Council set a growth target for attainment over the decade 1960-1970 of 50 per cent in real gross national product for the Member countries taken together.

At subsequent meetings, the Council has examined progress towards this goal; and last December it concluded that the increase of the GNP of OECD countries taken together has so far been roughly in line with the growth target.

The Council's conclusion was based on the following estimate of prospects for 1965.

The present prospect is that despite restrictive measures in some countries, there will be a further substantial increase in demand and output in OECD countries, and also in their trade, in 1965.

Forecasts based on the latest information available about Member countries' prospects are shown in the table opposite. These show an aggregate expansion of gross national product between 1964 and 1965 of something over 4 per cent, as compared with an estimated increase of something over 5 per cent between 1963 and 1964.

For the Member countries excluding Japan, this would represent an expansion of output of 4.3 per cent a year in the 5 years 1960-1965. This is in line with the growth target of 50 per cent (annual rate of 4.1 per cent).

Though the forecasts for European Member countries suggest some slowing down in the rate of expansion of demand, the annual comparisons shown in the table conceal the fact that a slowing down has *already* taken place. The high rate of expansion shown between 1963 and 1964

as a whole was partly due to a rapid recovery during 1963 and early 1964 from the low levels of activity caused by the severe weather in early 1963. In several European countries there has been a levelling off in activity in the course of 1964 — and in Italy a brief decline. As a result the expansion of demand and output in European Member countries during 1964 (i.e. from the end of 1963 to the end of 1964) has probably been running at about 3 per cent.

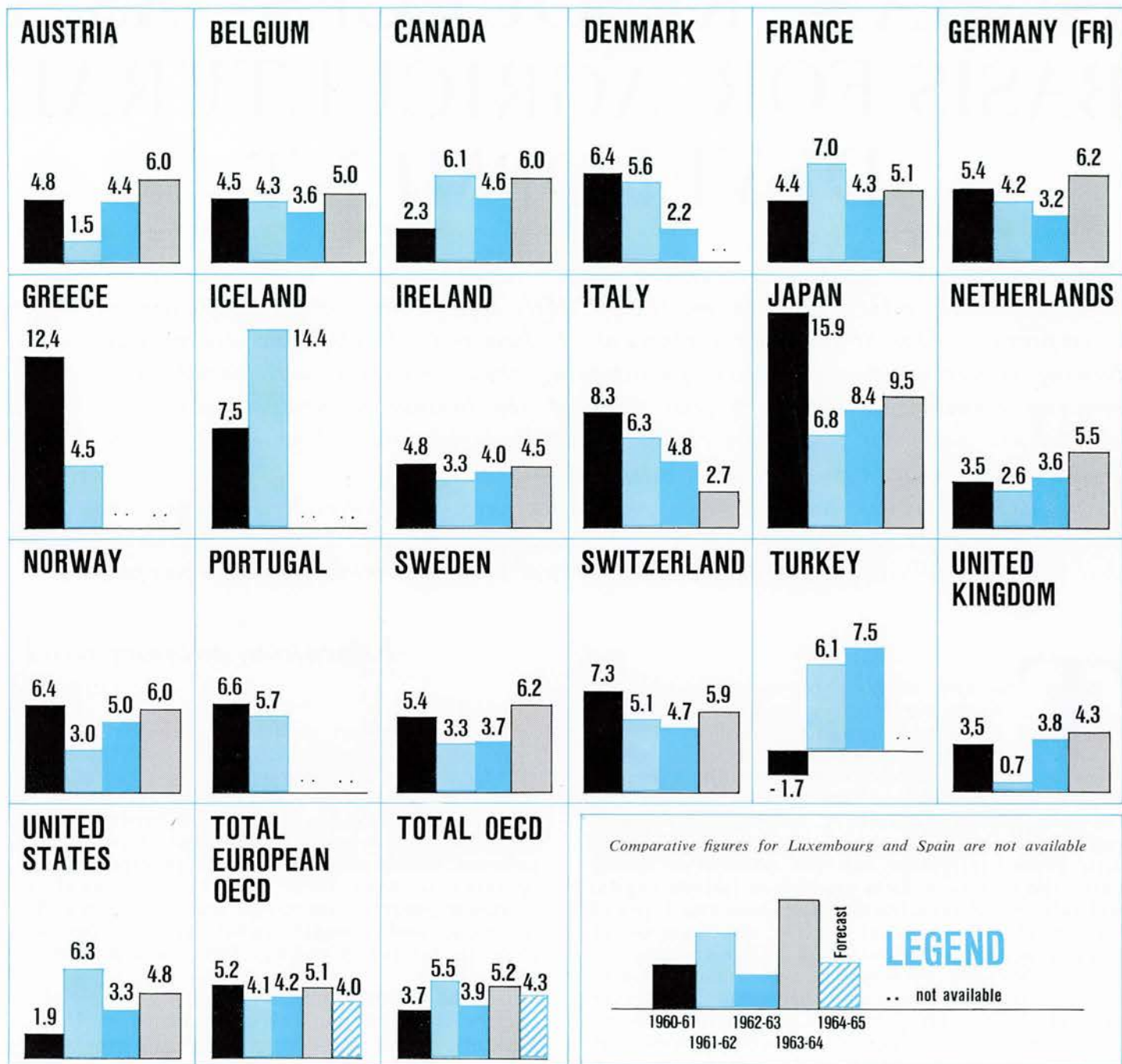
Expansion in Europe seems likely to be appreciably faster than this during 1965. In Italy the authorities have recently shifted from a restrictive to an expansionary policy and it is thought likely that output will respond fairly rapidly. It is also thought likely that in France demand and output will start a definite expansion after the recent phase of levelling off. Prospects in the United Kingdom are affected by the recent measures.

The forecast for the United States allows for a substantial continuing expansion of demand despite some slowing down as the direct effects of the tax cut wear off. It seems prob-

able that the pace of expansion in Canada will also be less than last year's very high rate. In Japan too expansion, though faster than in any other country, may prove to be below average by Japan's standards.

Prospects for continued expansion in world trade in 1965 appear to be good, although the rise is likely to be somewhat less rapid than in 1964. Between 1963 and 1964 the value of total OECD imports rose by nearly 11 per cent and total exports by nearly 12 per cent. This strong performance reflected sizeable increases both in intra-OECD trade and in trade with third countries. In line with the forecast developments in aggregate output, imports of OECD countries, both from each other and from the rest of the world, are likely to show a sizeable annual increase, even though smaller than in the previous year. Total OECD exports are expected to continue to rise somewhat faster than their imports, as third countries appear unlikely to accumulate reserves as rapidly as in the recent past. Altogether, total OECD trade is forecast to rise by some 6 to 7 per cent from 1964 to 1965.

GROWTH OF REAL GNP OVER PREVIOUS YEAR



GROWTH IN VALUE OF OECD EXPORTS AND IMPORTS

(Year-to-year percentage change)

| Total OECD | 1963 \$ billion | 1962-63 | 1963-64 | 1964-65 Forecast |
|-------------------------|-----------------|-------------|--------------|------------------|
| Exports, fob | 96.6 | 8.75 | 11.75 | 7.8 |
| Imports, cif (a) | 101.1 | 10 | 10.75 | 6.7 |

(a) Except US and Canada, which are fob

FULL EMPLOYMENT OF HUMAN RESOURCES AS A BASIS FOR AGRICULTURAL DEVELOPMENT

The modernisation of the agricultural sector already lags a long way behind that of other economic sectors, and the position is likely to become worse if steps are not taken to improve it. One of the most important of these is to develop and use more rationally human resources in agriculture. In adapting these resources to the needs of a rapidly growing economy, it is evident that some of the present manpower must move out of agriculture and that those who remain must be highly trained generally and be capable of exercising modern management methods.

The OECD activities are aimed at promoting national studies on this question; stimulating the interest of the circles concerned; encouraging forward plans of the developments desired; and devising working methods for use by governments for this purpose.

Education, advisory work, research

The area devoted to agriculture in the European Member countries of OECD has shrunk in twenty years from 192 million to 188 million hectares, i.e. by an area roughly equivalent to the agricultural area of Benelux and greater than that of Denmark. During the same period (1937-1957), employment in agriculture fell by 21 per cent. Apart from the land area under cultivation and the number of labour units, the factors of farm production include capital and intellectual investment (1). These two types of investment are essential to the development of modern agricultural production and marketing.

Louis Malassis, Professor at the Rennes (France) École Nationale Supérieure Agronomique, observes in a study on this problem (2) commissioned by OECD that the development of capital investment has been mainly brought about through the discovery of new production factors such as fertilisers, pesticides, machinery, etc., or through the improvement of traditional biological means.

For these reasons, "it is no exaggeration to say", Professor Malassis points out, "that the development of agriculture is based and will be more and more dependent on intellectual investments". The larger and less numerous farms of the future will require fewer but better-trained workers. Capital will tend to replace labour.

The development of human resources has three essential aspects which are more closely related to each other in agriculture than in other sectors: education (what steps should be taken to train the young and to provide refresher or further training for adults); advisory work (what technical and economic advice should be given to practising farmers in order to keep them abreast of technical and economic progress and enable them to increase their incomes); and research (what are the necessary elements for policy-making, farm management and marketing).

The main difficulty in obtaining the picture of the present day position and progress under each of these aspects in Member countries lies in the fragmentary and incomplete nature of the available statistics. Furthermore, the solutions adopted differ widely from country to country according to their traditions and levels of economic and social development.

Nevertheless some basic features may be discerned. To begin with, since a policy may be identified from budget trends, the breakdown of government expenditure provides an initial indication of the importance attached by Member countries to investments in the field of human resources in agriculture.

(1) As investment in human resources is sometimes called. (2) "Intellectual Investment in Agriculture for Economic and Social Development", OECD Documentation in Agriculture and Food, No. 60.

Public expenditure of this nature in Europe represents on an average 1.1 per cent of gross agricultural product; in France, Italy, Greece and Turkey, it accounts for 0.5 per cent or less. The Netherlands, Belgium, the United Kingdom, Sweden, Norway and Iceland spend more — or much more — than the average. Expenditure per hectare and per farm is also of particular significance. The Netherlands, which spend most per hectare, spend three times as much as the European average.

The development of human resources is one of the important means of direct action available to governments, which provides a special reason for planning their use efficiently. The orientation of these resources may be observed in the way priorities are established in allocating available funds and facilities between education, advisory work and research. It can be assumed that these priorities are related to economic development plans. The economically advanced countries as a whole devote substantial funds to research. Countries in the process of development find it an advantage to devote, at least initially, relatively more funds to education and advisory work.

Available statistics show that by and large the European Member countries of OECD may be grouped, in that respect, into two large areas: the industrialised countries of Northern Europe, and the Mediterranean countries in the south. The former take the lead in the search for and dissemination of agricultural knowledge. Thus it is not in the countries in which the agricultural sector is relatively the most important that the public authorities spend most on the development of human resources in that sector.

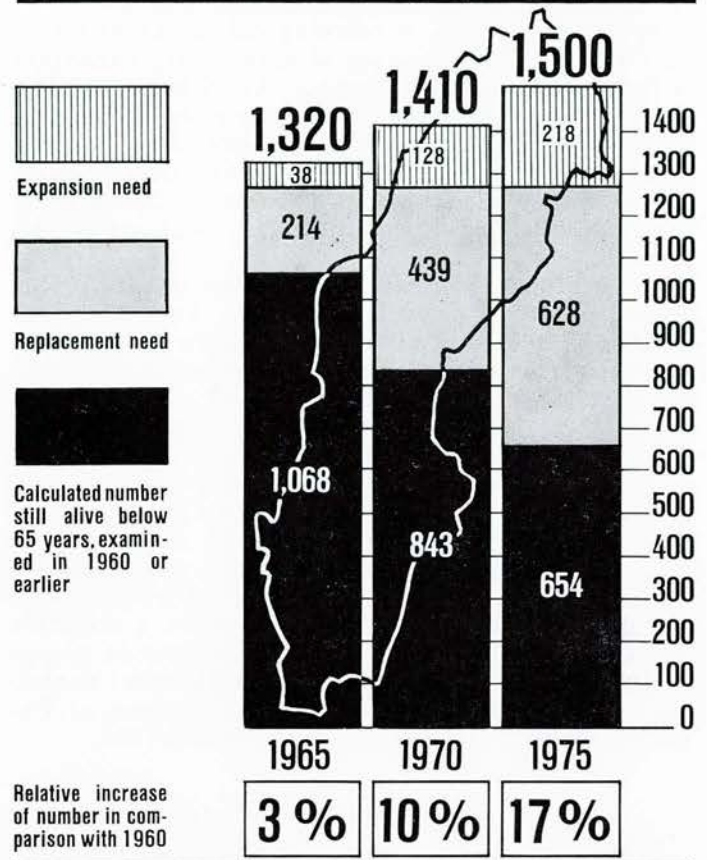
Pilot studies on the planning of agricultural education

The authorities are faced with many problems in regard to the training of farmers and farm workers. For instance, should their training take a distinct form of education? Should they continue to benefit from the general educational system for as long as possible, or should they receive special training at an early stage? Should their training give emphasis to general education or should their education be based on a more practical concept?

It would appear that economic and social developments lead increasingly to the need for the development of human resources in agriculture in close association with the work for the development of human resources for the general economy — a trend in keeping with the social desires of the rural community. The provision of good general education in any case meets both the desire to provide better training for the young people who are going to leave the rural environment and the need to provide a sound basis for additional special training in agriculture for those who will remain on the land.

With the intention of applying theory to practice, two pilot studies on the planning of agricultural education are now being carried out under the auspices of OECD. The purpose of these studies is to review the present position and to help in the

THE NEED FOR AGRICULTURAL GRADUATES OF PROFESSIONAL AGE IN SWEDEN IN 1965, 1970 AND 1975



preparation of development models for agricultural education which other countries could use as a guide. One of these studies is being carried out in Sweden, the other in France.

Dr Frank Petrini, of the Agricultural Economics Department at the College of Agriculture, Uppsala, who is working on the OECD study in Sweden, notes that in that country, where education is regarded as an essential condition of economic development, two problems are continuously under review — i.e. developments in the interest shown by young people and their parents in the various types of education, and changes in the relative size of the major categories of manpower. The surveys of the future demand for agricultural graduates are designed to throw light on two points: the “replacement” requirements created by the retirement of graduates who have reached the end of their career, and the “expansion” requirements arising from the desire to improve farming methods and to modernise agriculture. In the face of this demand for more future graduates, the supply of possible students, two-thirds of whom comprise young people from farming families, is very much influenced by the distance between the student’s home and the major educational establishments to be attended.

In 1960, the 1,282 graduates from the Uppsala College of Agriculture accounted for 1.9 per cent of all Swedish graduates. The latest forecasts reveal a certain shortage of agricultural graduates compared

with future requirements. This shortage may, in fact, prove to be even larger than expected. A forecast made in 1946 on agricultural graduate requirements in 1955 gave a figure of 179 units (19 per cent) less than the number of graduates actually employed in 1955.

Professor Malassis is carrying out a similar study for OECD on the planning of agricultural education in France; this has just begun. As with the Swedish study, it should not only give a more exact and reliable picture than is now available of the present situation, but it should also provide the methodological framework for comprehensive studies leading to modern planning methods to deal with this problem.

In addition, an organisational chart of the various forms of education in France has been prepared following the recent reform of agricultural education. It shows clearly the relationship and equivalence between general education, technical education and technical agricultural education. The main purpose of that reform was precisely to integrate agricultural education into the general educational system.

The studies undertaken under OECD auspices in Sweden and France should not only help, through systematic analyses, towards a better understanding of the present situation but also, and even more important, make it possible to plan on a scientific basis for the future. Special emphasis will be placed on this forward-looking approach at the next conference planned by OECD of representatives of Faculties of Agriculture to be held during 1965.

Adaptation of the farmer

To train future farmers is one thing. To provide practising farmers with the knowledge they need to

**TREND OF FRENCH ACTIVE
POPULATION BY BRANCH OF ACTIVITY
TO 1975 (UNIT : '000)**

| | 1959 | 1965 | 1975 |
|---------------------------------|---------------|---------------|---------------|
| Agriculture and forestry | 4,540 | 4,100 | 3,600 |
| Industry and building | 7,092 | 7,460 | 8,167 |
| Services | 7,208 | 8,060 | 9,503 |
| All activities | 18,840 | 19,620 | 21,270 |

keep themselves abreast of developments is another; and this is the role of advisory work. The task of OECD in this field is considerable. It has concentrated its action on two main points. First of all it has encouraged Member countries to develop farm management advisory work, the object of which is to enable farmers to manage their farms scientifically and so to increase their earnings. OECD work has brought about a great improvement in the advisory methods for farm management now in use. To achieve this different methods have been used, e.g. publications, articles, meetings of experts and study missions. All these activities have helped to promote the launching of management advice in several European countries and its improvement in all countries. But despite the keen interest shown in the problem and the efforts made, the number of farms taking full advantage of management advice, even in the most advanced countries, is not more than 1-2 per cent of the total. Studies and activities are continued with a view to expanding the economic aspect of advisory work, combined with advice on marketing.

Development of advice in agricultural marketing is another important object of OECD action in the field of agricultural advisory work. The Organisation has endeavoured to help advisory services in this field following a recommendation by the OECD Conference of Directors of Agricultural Advisory Services held in 1963. A first working conference on advisory work in agricultural marketing was organised in 1964. The results of this conference will assist the advisory services in improving their advice, particularly as regards standards of quality and marketing of produce (by giving guidance as to how, when and where to sell). Without advice of this kind being given to a large number of farmers, especially small-scale farmers, the inputs of capital labour and fixed resources on the farm level would remain unproductive, and investments intended to improve the agricultural structure would not produce the expected economic and social results.

It is planned to continue this work in 1965. The agricultural programme of OECD contains provisions for the organisation of an international course to train marketing specialists for the advisory services. In another activity under its 1965 programme it is planned to prepare one or more "models" designed to show the farm advisory services the kind of market information their marketing specialists will need.

Research

The adaptation of agricultural research represents yet another complementary field of action. Due to the limited resources available, only three areas of study have been selected in this immense field.

One of these is the adaptation of management and administration of agricultural research in the light of general economic growth. Meetings of experts to discuss the management of research were held during 1964, and in 1965 OECD intends to review the present state of research in the various Member countries. This examination will include the study of data on such problems as the organisation of

ACCESS TO STATE EDUCATION IN FRANCE (PERCENTAGE 1958-1959)

| (1) 1954 census. | | SECONDARY EDUCATION | CONTINUATION COURSES | TECHNICAL TRAINING | BREAKDOWN OF THE ACTIVE POPULATION (1) |
|--|-------------|------------------------|-------------------------|-----------------------|--|
| FARMERS | | 6.4 | 9.8 | 5.6 | 20.8 |
| AGRICULTURAL WAGE-EARNERS AND EMPLOYEES | | 1.2 | 2.5 | 2 | 6 |
| EMPLOYERS | Industrial | 2.9 | 0.9 | 1.7 | 0.4 |
| | Commercial | 10.2 | 8.2 | 7.4 | 7.7 |
| | Handicrafts | 5.9 | 6.8 | 6.6 | 3.9 |
| LIBERAL PROFESSIONS AND HIGHER EXECUTIVE | | 17.2 | 2.6 | 4.3 | 2.9 |
| MIDDLE EXECUTIVE | | 15.8 | 11.1 | 10.3 | 5.9 |
| EMPLOYEES | | 15.8 | 16.5 | 15 | 10.9 |
| WORKERS | | 14.4 | 33 | 35.8 | 33.8 |
| SERVICE PERSONNEL | | 1.3 | 1.8 | 2.9 | 5.1 |
| NO TRADE | | 2.4 | 1.6 | 3.2 | |
| MISCELLANEOUS | | 6.5 | 4.7 | 5.2 | 2.6 |

agricultural research, machinery for disseminating research findings, documentation and information centres, etc. A study will also be made in 1965 of personnel problems affecting agricultural research, as well as of methods of evaluating research programmes in the various countries.

The second object of study concerns co-operation between workers in the technical and economic branches of agricultural research in preparation of selected input-output data. The subjects chosen are meat production (United Kingdom to conduct the work), fertilisers and crops (Sweden), poultry-keeping (United States) and dairy production (the Netherlands). The purpose of this study is to supply data needed for farm management and allied purposes; it will also give a lead in international co-operation which might be followed for other products.

Finally, OECD is promoting a drive to stimulate research on the adaptation of agriculture to general economic growth. A first seminar was held on this subject in December 1964, which included a review and identification of the major common problems raised by the general economic growth in Member countries. In 1965 it is the intention of OECD to encourage co-operative research programmes in this field, the results of which should be valuable to policy makers, farm leaders and farmers in general.

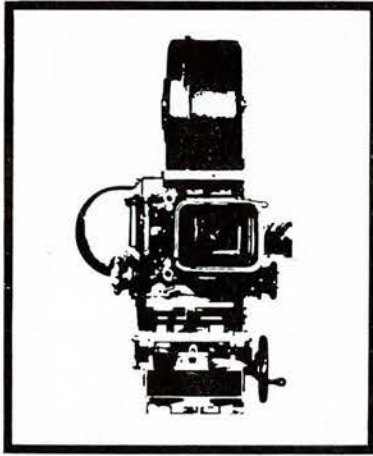
Information

Co-ordinated with its work on agricultural education, advisory work and research, OECD is active in promoting the exchange of agricultural information through its quarterly periodical, the FATIS Review (an international review of agricultural develop-

ments). Its aim is to inform the authorities and agricultural leaders in Member countries of the work done by the Organisation in agriculture and to encourage them to take advantage of OECD initiative and other countries' experience in adapting agriculture to the needs of an expanding economy. The FATIS Review, published in seven language editions (English, French, German, Greek, Italian, Spanish and Turkish) totalling 24,000 copies, and FATIS liaison officers in the 21 Member countries and Yugoslavia help to circulate this flow of information.

For farmers in the year 2000

The rapid growth of the economy dominates the whole question of the development of human resources in agriculture. It is the farmers of the year 2,000 who are going to be trained in the course of the next few years. The knowledge that they will need will be very different from that available at present. It is therefore important for them to "learn how to learn" rather than to accumulate a supply of "recipes" which rapidly become outdated. "The rapid and effective pursuit of technical progress," writes Professor Malassis, "presupposes a satisfactory information (advisory) system, supported by a basic training that enables farmers rapidly to assimilate new techniques. Thus the system of intellectual investments in agriculture expands and changes in conjunction with economic and social growth and development. These changes are related to both the acceleration of technical progress and the social aspirations of those engaged in agriculture. Their access to education and culture, to vocational training and information, is a basic feature of a parity policy."



Guidelines on agreements for the international co-production of films

Among the many problems affecting invisible trade among OECD countries — trade, that is, which does not involve the buying and selling of goods and produce — are certain aspects of the film industry. Under the terms of the OECD Code of Liberalisation of Current Invisible Operations, Member countries undertake to keep international trade in films as free as possible of restrictions arising from quota arrangements and other regulations. As part of its educational effort, the Organisation has sponsored the co-production of six science-teaching films which enjoy specially favourable terms for their distribution and showing outside the countries of origin.

Bilateral co-production of films has scored some marked successes over the last few years; and the Council of the Organisation has recently recommended Member governments wishing to conclude bilateral agreements for such co-production to take into account certain guidelines when drawing up agreements. Governments have agreed to report to the Organisation by 20th July, 1966, on the measures taken by them to implement these recommendations, and where appropriate to provide the Organisation with the texts of bilateral agreements.

The guidelines recommended to Member governments by OECD are centred on the principle that films produced under co-production arrangements and entitled to the benefit of a co-production agreement should be granted the same treatment as domestically-produced films by the signatory countries.

Producers and Directors

Producers should dispose of adequate technical and financial resources for the proper completion of co-production films.

Directors and their teams of artists and technicians should as a general rule be representative of the culture of one of the countries taking part; though nationals of other countries should be allowed to participate under agreed terms.

Each signatory country should grant the facilities necessary for the movement and temporary residence of artistic and technical personnel, and for the import or export of necessary material.

Production Arrangements

One negative of a film produced under co-production arrangements should be the property of each co-producer; the contribution of each should not in general be less than 30 per cent of the cost of the film. The same proportion should be observed as regards the employment of personnel and the use of installations and equipment.

Film Quotas

Co-produced films should normally be counted against the quota of the country of the producer who has had the larger share in it.

If either signatory country is entitled to the unlimited export of its own films to the importing country, co-production films should benefit from the same advantage.

Commercial Earnings

Receipts from commercial showing should be divided in strict proportion to contributions. Even after the date fixed for its expiry, a co-production agreement should remain valid for the apportionment of receipts.

Admission to the Benefits of Co-production

Rules of procedure for the admission of films should be drawn up by the signatory countries. It should be made clear that any form of authorisation granted by the authorities

of the countries concerned in no way commits them so far as the public showing of the film is concerned.

Producers from the signatory countries may be permitted to produce films in collaboration with producers from non-signatory countries so as to enable these so-called "co-participation" films to benefit from the same advantages as co-production films.

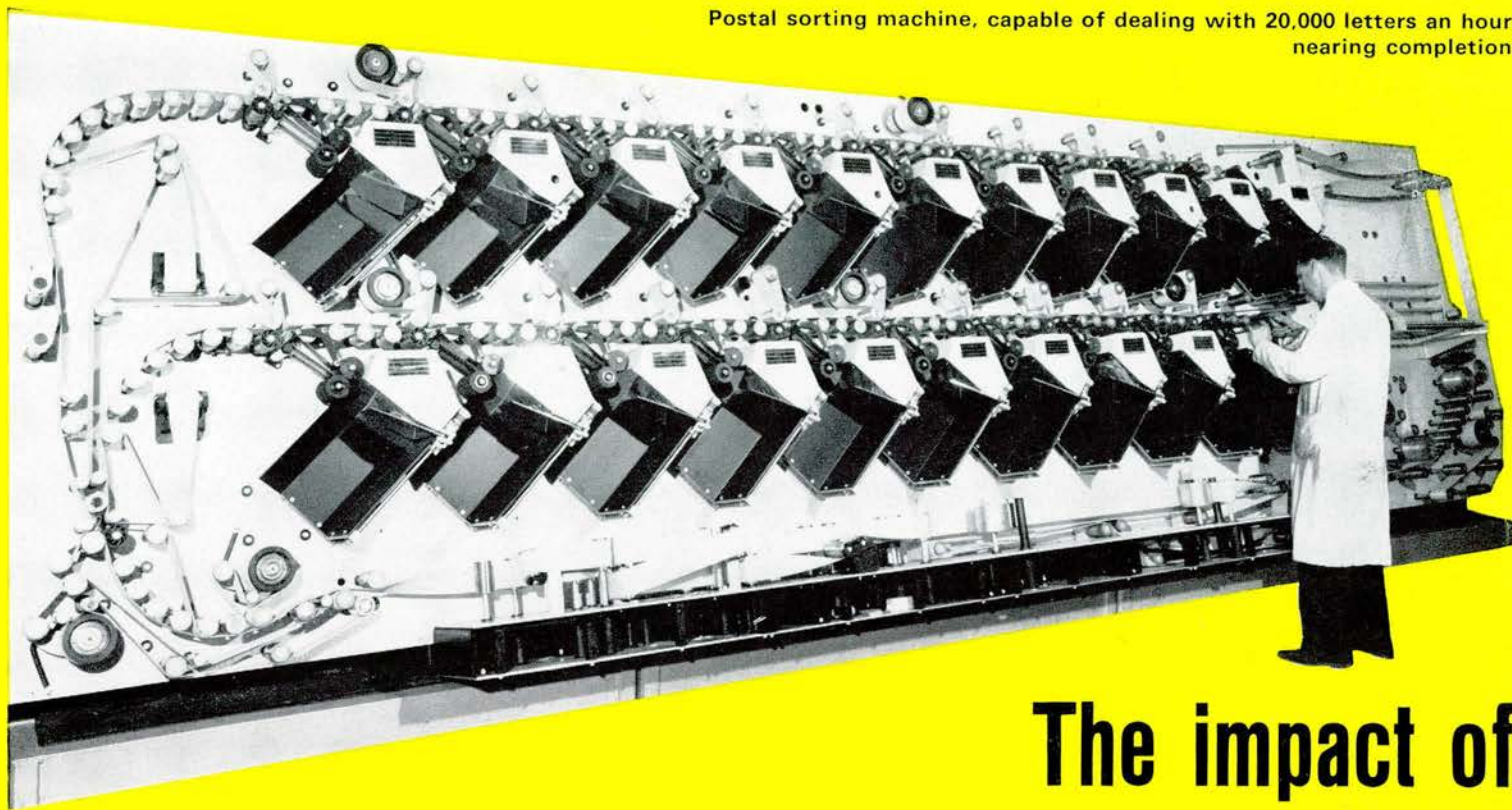
Joint Commissions

A joint commission of officials and experts of the countries concerned should meet periodically to settle any difficulties arising out of the application of a co-production agreement, and in particular the share of the financial, artistic and technical contributions imputable to each co-producer.

Duration of Agreement

A co-production agreement should be valid for a period of one year, and unless formally terminated should remain in force from year to year.

Postal sorting machine, capable of dealing with 20,000 letters an hour, nearing completion.



The impact of **AUTOMATION**

As experience with automation accumulates, it is increasingly evident that the adoption of automated processes means far-reaching adjustments on the part of individual workers, management, trade unions, and governmental policy makers at all levels.

Automated processes are not as yet in wide use considering their potential area of application, but in North America there is more actual experience with automation than in other countries.

In mid-1964 almost 20,000 general-purpose digital computers - the cornerstone of many automated processes - were installed and some 6,000 were on order. More than 12,000 electronic data processing systems are in place in banks, insurance companies and stores, and other forms of automation such as the tape-controlled machine tool and the automatic order-picking system have been adopted by some firms.

In order to examine the North American experience and to assess its implications for policy making both in North America and Europe, OECD's Manpower and Social Affairs Committee, in co-operation with the US Labor Department and the Canadian Ministry of Labour, held a conference in December on "The Requirements of Automated Jobs and their Policy Implications".

The meeting brought together 165 business and trade union leaders, academicians and government officials. Excerpts from speeches given by the honorary presidents of the conference - Thorhild Kristensen, Secretary General of OECD, Willard Wirtz, U.S. Secretary of Labor and Allan J. Mac Eachen, Canadian Minister of Labour - are presented here along with an article by Solomon Barkin, OECD Manpower and Social Affairs Directorate, who organised the conference.

Thorkil
KRISTENSEN

We consider this conference an important event because we think that you are dealing with a problem of fundamental importance in the present stage of economic development. The central problem is to adjust our societies to rapidly changing patterns of production and employment. Economists can easily prove, and they have done it often, that if labour is replaced by machinery here and there, new possibilities arise because we become more wealthy and can increase our consumption. This is true, but it is only part of the story because the new jobs are in new places, and they are of a different kind than the old jobs. The changing character of the job requires human beings to adjust through retraining, through re-education and perhaps by moving to other places as well. It is not easy therefore to avoid some transitional unemployment when rapid change is going on. But if that change continues for a long time, transitional things tend to be with us for many years.

I should like to mention just one type of problem that has presented itself to us as we try to work out more adequate policies of adjustment to recommend to our Member governments.

One of the paradoxes which has puzzled me in the course of recent years is that if we look at North America, which has the highest degree of economic development in the world, we see that in spite of rapid economic growth there is still too much unemployment. When we look at Europe, somewhat further down the scale as far as economic development is concerned (at least for the time being), we see that there is on the whole very full employment indeed; there is in fact a shortage of manpower in a number of European countries, as a result of which inflationary tendencies have developed. But as we move further down in the scale of economic development to the less-

developed countries, we again find unemployment and, in agriculture, under-employment.

What is the explanation for this? Is it partly that mechanisation and automation are further advanced in North America than in Europe and that we will have the same problems in Europe when automation spreads there in the years to come? As we solve the present problem of labour shortage, will we move to the other extreme and also have more unemployment in Europe?

And what shall we teach the under-developed countries? Shall we tell them to start with the most modern techniques as our friends in Japan are doing? Or shall we say to some of them "You still have so much and such cheap labour that you should not use the most modern techniques. You should adopt more primitive techniques which use more manpower and less capital"? I have studied the five-year development plan of Turkey, for which OECD

Willard
WIRTZ

If a single theme has emerged here it is that so far as manpower policy is concerned we are all still practising empiricists. There has been repeated reminder that the stuff for syllogisms is still lacking, that experience remains a more reliable guide than logic to manpower conclusions. The semantics of the subject are still in flux. The available statistics report only that fevers are rising or falling; they say little of the causes of distress or well-being.

You have confirmed here the good sense of continuing to believe what we see — and of guarding against seeing only what we believe. How then do we best proceed with the administration of manpower programmes given the present state of our innocence?

I suggest that there are three important and inter-related elements in the development, at this stage, of a manpower programme.

First, we must be willing to

countries have formed a foreign-aid consortium. In spite of fairly large investments and an ambitious growth target, this plan envisages that after the five-year period there will still be much unemployment in Turkey. Would it be better to use methods that require less capital and could absorb more manpower, knowing that we are doing something odd, giving Turkey a productive machine that is not the most modern one? I think that this is one of the problems that we shall have to deal with when we look into all the repercussions of rapidly spreading mechanisation and automation.

This is a conference about North America, but the problems in Europe are different. They are even more different — and in another way — in the less-developed countries. It would be useful to know exactly how and why they are different so as to be able to handle them in the best way possible.

proceed on what seems to be the firmest ground available — and equally willing to recognise that drastic changes in course may be required.

This is not easy in government which relies upon common consent. One of the paradoxes of government by the people is that people assume that the governors know more than the people do. And a confession of error is always dangerous politics.

Most rational thinking about the manpower implications of automation today proceeds from an acceptance or rejection of four propositions:

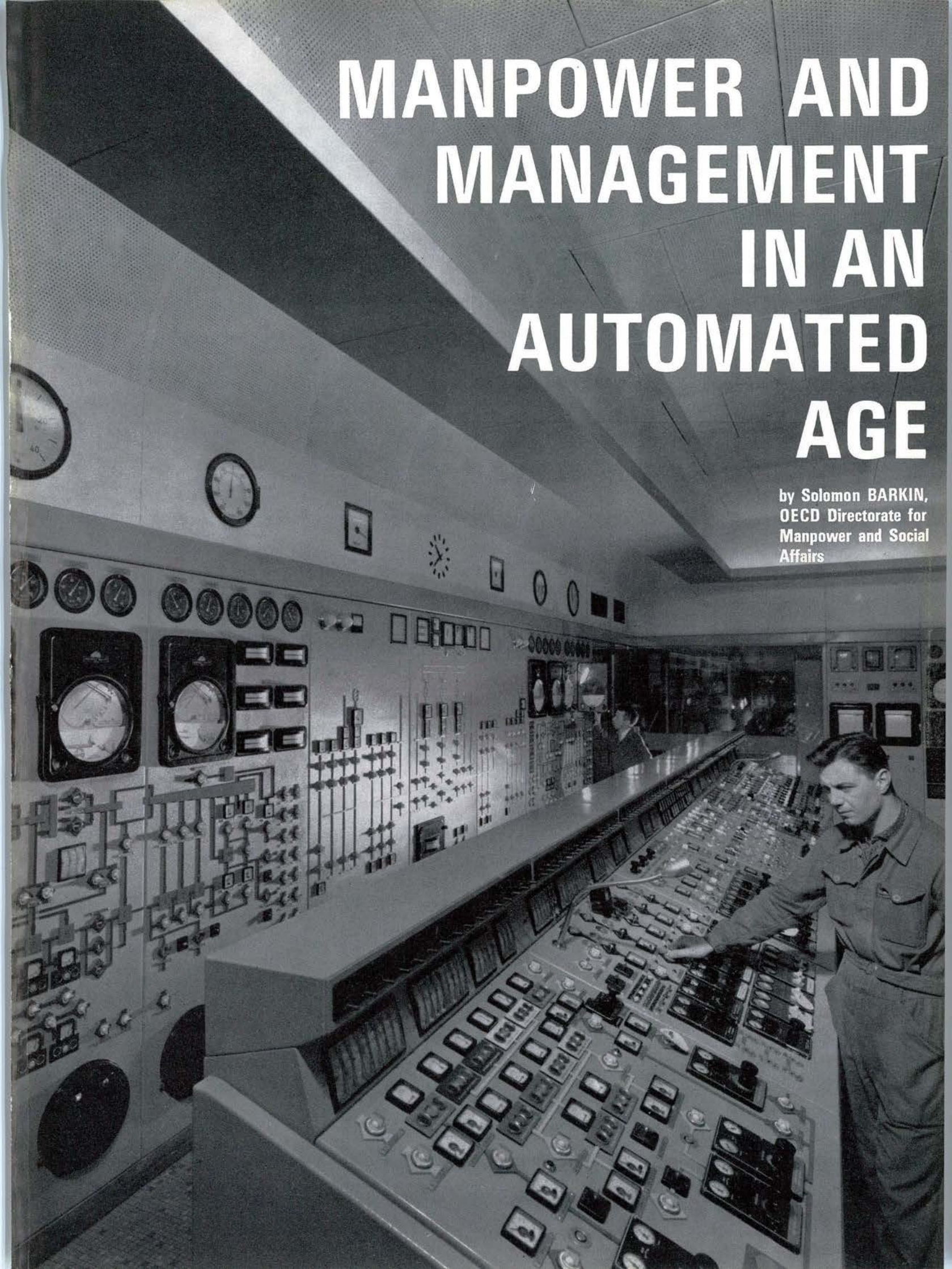
1. That the overall rate of technological change is accelerating;
2. That increases in aggregate demand will provide adequate adjustment to technological change;
3. That automation produces more jobs; and
4. That educational requirements are rising more rapidly than educational attainments.

I understand it to be the consensus of this conference that there

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MANPOWER AND MANAGEMENT IN AN AUTOMATED AGE

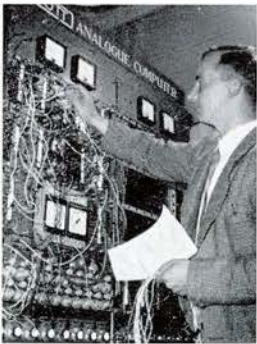
by Solomon BARKIN,
OECD Directorate for
Manpower and Social
Affairs



AUTOMATION, a new system of technology, is ushering in a host of novel machines and processes and a radically different manner of management. These foreshadow many significant changes for the work world and for our economic and political societies.

What the precise impact of the new technology will be on our systems of industrial and social organisation is not easy to foresee. The history of economic development shows that there are few inexorable consequences of the acceptance of a new technology and that similar technologies can give rise to very diverse social and economic arrangements. The actual effects of automation will depend on the specific environment in which it takes place, on the practices of management and on the economic policies that are adopted.

Industrial and social orders are subject to man's control, and it is feasible to adjust the manner of application of a technology in the light of the desires of those whom it affects. We have learned this from experience: the social blights which came in the wake of the industrial revolution aroused strong protest and movements for the improvement of working conditions; and in the later stages of that revolution, countries came to anticipate such reactions by controlling the innovations to avoid some of their unfortunate effects. Child labour was ruled out; factory safety and sanitation were made the object of legislation; hours of work were reduced, improvements in wages and standards of living fostered. The unemployed were given assistance, and other social benefits and services were instituted to help people adjust to the new conditions. In an automated industrial system it is particularly apparent that identical objectives can be programmed in many different ways and therefore are within the realm of choice of the programmer himself.



THE NATURE OF AUTOMATION

Examination of the characteristics of the new technology and of the American experience with automation can serve to deepen our understanding of its possible impact and help us to prepare appropriate policies and institutions. Automation is obviously a form of mechanisation which differs from other innovations, primarily by reason of the sweep and depth of its likely effects. It substitutes machines for the performance by man of cognitive and informational processes. The new methods are not limited to a specific sector but are applicable to the widest range of industry. Automation has permitted the extension of mechanisation into areas, operations and fields which in the past had almost completely defied such changes. The computer, in particular, has already penetrated industries where little mechanisation previously

existed — banking, for example, and insurance. It has permitted the substitution of "synthetic intelligence" for routine human mental work and even for some highly sophisticated human mental operations.

Moreover, unlike other types of mechanisation it has penetrated all phases of the operation of an enterprise — production, clerical work, distribution, selling and also management.



AUTOMATION'S IMPACT ON JOB CONTENT AND STRUCTURE

Our only significant body of information on the impact of automation is necessarily to be found in the United States where the new technology has had an important, though not as yet far-reaching, impact. What emerges from the US experience?

Old occupations are changing in content, requiring new occupational concepts and groupings. For the 1965 Dictionary of Occupational Titles, to be issued by the United States Employment Service, a new system of occupational classification has had to be adopted.

The trend, which began with mechanisation and mass-production, towards eliminating unskilled labour has continued to the point where such labour is hardly to be found on the plant premises any longer. Either the function has been eliminated, or the job is being done with machines, or the employee's responsibilities and duties have been enlarged beyond the scope of the old job.

To take a typical example of the kind of change in job content that has been observed: the machine attendant in an automated plant. He is neither a blue nor a white collar worker but may be characterised as a "white coverall worker". He does little manual work, relying primarily on his conceptual skill. His responsibilities are great, for he must espy impending breakdowns from causes not previously identified nor allowed for by the machine. On the basis of his knowledge of the machine and the functions it is performing, he must sense and perceive disorders and discriminate between normal signs and those indicating breakdown or unusual loss of efficiency. The specific combination of duties will vary considerably from plant to plant and industry to industry. In some cases the worker will assume the responsibilities of a technician or maintenance man. In others the work may be enlarged in various other ways to improve interest and provide greater incentives.

Flanking the "white coverall worker" are the many advanced maintenance workers whose competence extends beyond the older craft skills. They must have a thorough knowledge of pneumatics, hydraulics and electronics. More and more the old craft divisions are yielding to the "all round mechanic" equipped with this sophisticated knowledge. (In this connection, however, a new trend may be observed in the United States, towards the sub-



contracting of services such as maintenance or cleaning. Workers engaged in this way are, of course, more specialised and may be organised in accordance with older systems of work allocation.)

The overall effect on the occupational structure of the economy as a whole is indicated by the changing composition of the work force. In some new industries production workers represent only 40 per cent of the total work force as compared with 75 per cent in older industries.

MANAGEMENT AND AUTOMATION



Equally significant is the change being wrought in the occupational structure of management. The speed of data collection and communication has reduced the need for some layers of middle and lower management. As the newer automated technology takes hold, it also permits a changeover from "scientific management", based on specialisation of function for both workers and management, to "system management" built on the idea of integrating all functions; human assistance is eliminated insofar as possible except in the field of policy making in which operations research techniques are widely employed. This change in approach has reinforced the tendency towards reduction in the number of tiers in the management hierarchy. And middle management is undergoing the same dehumanising process that blue collar workers have already experienced. Just as the latter lost the functions of planning and decision making to staff personnel during the era of "scientific management", so the computer is taking these same functions away from middle management and transferring them to corporate headquarters' staff.

DRAWING LESSONS FROM THE AMERICAN EXPERIENCE



In drawing conclusions for other countries from the American experience it must be kept in mind that the shift in job profile and structure in the United States is not merely the result of the growing use of computers and other automated processes. It stems also from the high level of capital investment, the prevalence of large corporations and the relatively advanced education enjoyed by

most inhabitants. Environmental conditions are not necessarily the same in other countries, and if relevant analogies are to be drawn, there is a striking need for detailed study of the contrast between trends in the United States and those of other countries. We must have a profound understanding of the variety of factors which will affect the rate of obsolescence of plants, locations and jobs and a delineation of the trends which are likely to determine the location and nature of the new jobs.

A whole series of questions must be raised. The first group relate to productivity. What is the relative rate of increase in productivity? Is it being produced through expansion and the introduction of new industries or is it the product of the substitution of newer, more technologically advanced industries for older ones? To what extent are old plants being closed? Secondly as to location : where is new industry locating? Is the growth of new industrial sites occurring at the expense of older ones? Are the latter likely to decline in number and employment? The third group of questions has to do with the job-manning system in the particular country. How does it compare with American practice? What forces will encourage a movement in the direction of American practice, retention of present practices or the introduction of quite different ones? What will be the sectoral shifts within the country? Will they be in the direction of the service industries, or is the trend from agriculture to industry still so strong that the predominant movements will still be in this field? What will be the structure of jobs for the entire country as a result? The correct appraisal of these various trends is an essential prerequisite to further manpower planning in every country.



GUIDELINES FOR A MANPOWER POLICY

Certain general lessons can be drawn from US experience even if the pattern that emerges in Europe turns out to be different in many respects.

Automation is introducing a new technology and system of management which are likely to have far-reaching effects on economic behaviour and policy and on methods of administrative organisation, jobs, individual lives and our entire economic and social system. The probable sweeping impact of the new technology makes it unlikely that we can rely as heavily as before upon the automatic adjustment processes in the labour market. Adults who have not had the training and preparation will need the assistance of an organised labour market mechanism prepared to counsel, guide and assist them in making the adjustments. Management and capital will also require help in accelerating their understanding of

the changes and in accommodating to them so as to stay competitive and contribute more effectively to the realisation of national and social goals. All nations must therefore consciously update and organise their institutions and services, better to achieve the ends to which they are now committed.

Workers will experience changes in job content, occupation, geographical site of employment and employer more often during the course of a lifetime than they have done previously. Conceptual skills will replace manual ones in importance. The emphasis on job requirements, therefore, will be on the three R's plus communication skills and general knowledge.

The precise curriculum for training young people so that they can adapt to change will, of course, be partly determined by forecasts of the type of industry and jobs which will tend to expand in the country.

Since this training is in preparation for a lifetime of employment, the forecasts must be made on a medium as well as on a long-term basis. Facilities for retraining adults must also be organised, and both types of training will have to change as the educational preparation of the young improves. Accelerated training for specific skills may have served in a less automated age. But can it be as useful for young and middle-aged adults as we approach an automated industrial system similar to that developing in the United States? Associated with such training facilities must be programmes for guidance and counselling, particularly for the adults who will, for some time, be reluctant to undertake training and who will require the support of a counsellor to encourage them to do so. Funds for the maintenance of the adult and his dependents during training are vital if the shift is to be made freely. Similarly, geographical transfer assistance is essential if the worker is to adapt himself to the changing locations. Adjustment to new areas would be considerably facilitated by social services in reception areas and by adequate housing.

It is essential for any organised response to automation that there be a working partnership between the individual enterprise and national agencies in developing manpower policies and operating adjustment facilities both in the enterprise and the community. These have hitherto been kept separate and distinct; only a few countries have made any effort to forge a close relationship between them. The manpower policies of the enterprise developed either by management or preferably through collective bargaining must be in harmony with those of the community. The operations should be synchronised so that each can be confident that the other will perform competently and adequately its own functions and so that each can call upon the other for assistance. But the individual must never suffer from the fact that two agencies are complementing each other : the ultimate responsibility must reside with the public system.

What will be the employee's attitude towards changes caused by automation? Those who argue either that employees welcome or that they automatically reject change, fail to take into consideration the complex of factors which determine human reactions. One cannot be dogmatic on this question because employees' reactions will depend on their expectations for the future, on the rewards to which they can look forward — on a whole complex of social, economic and cultural elements. The task ahead is to create an environment, a climate of opinion and opportunities that will favour a positive attitude to change.

is little reliable evidence either to affirm or deny the truth of these propositions.

Faced with the necessity of making decisions every day which proceed from some combination of belief or disbelief in these propositions, the only effective and responsible manpower administrator is one who is ready to proceed vigorously on his best belief, and to recognise tomorrow that yesterday he was wrong. The only responsible manpower adviser is one who is willing to advance — if necessary — advice he considers 51 % true, and then spend tomorrow rechecking his figures instead of saving his face.

The second necessary proposition is that ignorance of facts — when they can be obtained — is no excuse.

We are today spending probably thousands of times as much to find the facts of physical science as we do to discover the truth about social science.

The reason is a sorry one. Research into the secrets of technology promises individual financial profit, material progress, and success at war. Research in the science of people promises most clearly only the enlargement of life's meaning, especially for people who otherwise come out on the short end of things.

There is so little appreciation of the real magnitude of what needs to be done to develop the raw material of knowledge in this field — and it is so hard to explain. Some of you will have shared with me the experience of trying to persuade a legislative committee to appropriate the funds to conduct an input-output study which would let us predict the skill needs of millions of people. It would be easier to try to get a hundred times as much to support the research which would get us two months earlier to the moon.

So far, we have sought little except the maintenance of indices which tell us where we have been and where we are now. Yet in the present and prospective rapidly changing economy, the skill structure of industry and commerce today is hardly even relevant to the planning of education and



The Washington Automation Conference.

training — except as a launching pad for the necessary projections.

Automation is one factor in the present employment-unemployment situation. The tremendous growth in population is another. A discussion of manpower policy is incomplete without full exploration of the nature and implications of both developments.

So the second element in a developing manpower policy must be the full pursuit of knowledge, about all of its elements.

But the third proposition must be that the ultimate truths of a fully developed manpower policy are human truths that transcend economic conclusions, in the traditional sense.

The most serious long-run manpower implication of automation is probably not that it will reduce — or increase — employment, but that it may contribute greatly to the depersonalisation of the whole idea of work.

This is partly a matter of the meaningfulness of the kind of function the machines of the future will leave for men and women to do.

I emphasise here the different point that in our development of manpower policy it is critically important that it be kept in mind that it is *man*, not *power*, that is our end purpose.

We have officially abolished the phrase “labour market” from

the US Department of Labor lexicon. Our language must keep up with our laws; and labour is not a commodity.

It is more important today than ever before that we dig out, so that we can see what it really means, the assumption which has been the tap-root of our thinking: that man was made for work instead of work being made for man.

It isn't so.

I am presently convinced that automation makes more jobs than it destroys — although the statement itself suffers so from semantic fever that it is barely rational.

I am equally convinced that, given “automation”, or, more precisely, given the maximum anticipated rates of increased productivity and economic growth, the unemployment rate in the United States would very probably continue at substantially five per cent or more in the absence of an affirmative manpower policy; that an average of four million people — or more — would be left out of what can be accomplished by the maximum anticipated increase in aggregate demand.

I mean by an affirmative manpower policy the fuller education of many who will not be fully educated under present practices, the training of many who will not be trained under present practices, the provision of constructive work

opportunity for some who will not otherwise receive it, and the deliberate attention of this community to the distribution of the available work.

Put differently, it seems to me relatively clear that attention to the economic *system* as a whole will probably not reduce unemployment below five per cent, and that the rest of the job depends on attention to *people* as individuals.

If this is true — and I urge only that there is respectable reason to believe it — then it is essential at this stage in the evolution of manpower policy that it be recognised not only that Adam Smith was wrong but that Lord Keynes covered only part of the problem.

Allan J.
MacEACHEN

We are all I think agreed that technological change and automation in the long run will immeasurably improve the lot of all of us. We don't want to stand in the way of the progress of the age of automation. What we want is to get all the long-run advantages of the age of automation without the short-run misery that was associated with the Industrial Revolution. We must find ways to harness this beast of burden before it becomes, even for a short time, a beast of prey.

If we could attain a fully automated society suddenly, we could avoid many of the difficult growing pains, but we face a fast-changing situation in which further manpower adjustments are needed even before previous adjustments are completed. The national need grows greater for flexible policies, programmes and procedures to facilitate the adjustment of manpower problems.

Our most immediate need is to keep employed a rapidly rising labour force in the face of a steadily declining manpower input per unit of output of goods and services — in plain words, increasing productivity.

Second, we must find ways and means to minimise the growth of

disadvantaged groups of people. As we know, technological changes can, and do, affect a great many working people favourably or adversely with respect to employment, working conditions and income. We have a responsibility to those who are adversely affected.

Third, we must effectively prepare our young people for the ever-changing world of work which they will enter. Here manpower planning can include a tremendous range of legislative and other measures, limited only by the total amount of public money available for investment in them, to the end that we develop effective and secure young workers and responsible citizens.

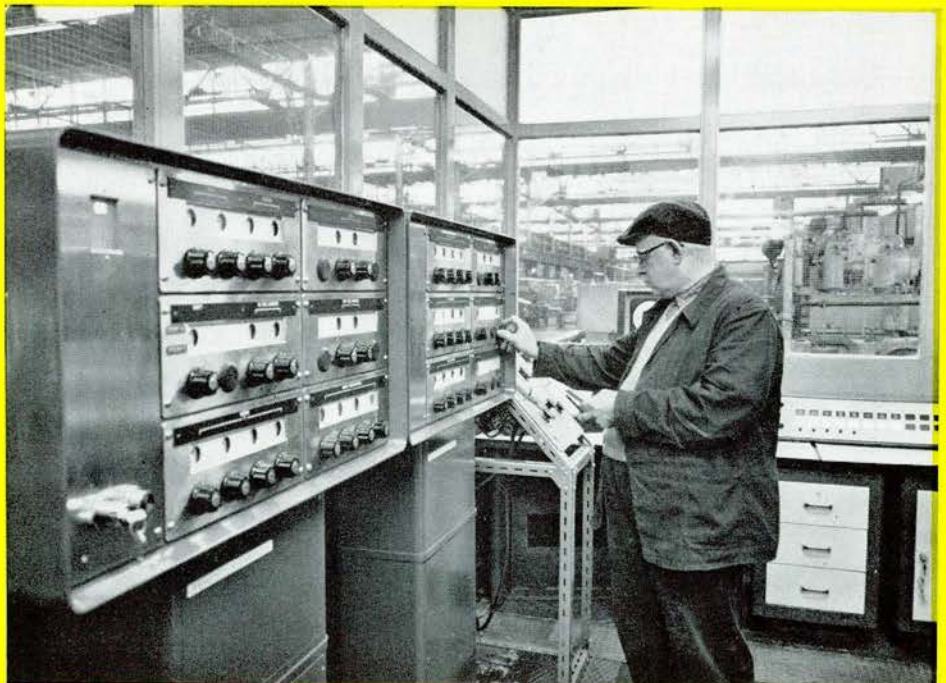
We need more and more the generation of light from unremitting research and critical examination so that there can be a continuing development of new policies and programmes and an improvement in what we are doing now.

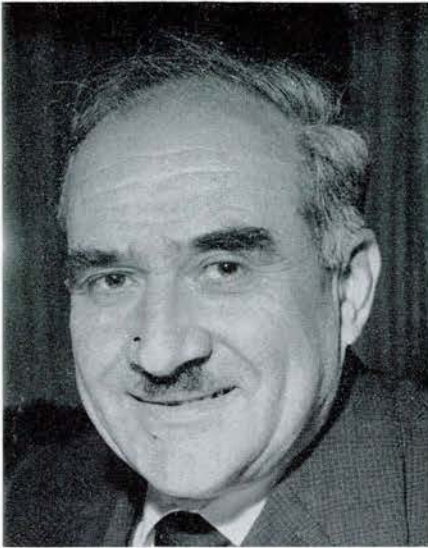
We can talk about manpower adjustments as being a factor of efficiency contributing to economic growth, full employment, and rising income. This is right. But we must always remember that "manpower" really means "people" — people with plans and ambitions of their own. They make assumptions and judgments about industry, about their

future in the industry, and they have goals and objectives of their own. They are not just workers; they are people, and as such they form attachments to other people, to institutions and to communities. We must remember this when we design manpower policies and programmes. The role of these manpower policies and programmes must be to provide the individual with a suitable environment and the best possible opportunity to make his decision about what sort of adjustment he needs and wants to make when technological change has disturbed his job. I believe we are working in this direction.

However, while government programmes are essential in performing either an enabling or a catalytic function, many manpower problems can only be dealt with effectively when management and the unions co-operate in making it possible for workers to make the necessary adjustments. In other words, the challenge of advancing technology and automation is something we have to meet and resolve on many fronts. It demands the active participation and co-operation of government, management and unions. With the progress we have made in this direction, I am confident that we shall have that participation and co-operation — and in time.

A steel worker feeds information into a quality control system.





THEORY AND PRACTICE IN TRANSPORT ECONOMICS

At the closing meeting of the International Symposium on theory and practice in transport economics organised by the European Conference of Ministers of Transport⁽¹⁾ last October with the co-operation of OECD and the Council of Europe, the final summing-up of the meeting was given by M. Louis Armand, former Director of the Société Nationale des Chemins de Fer Français and adviser to the French Government on energy and related problems. The article which follows is based on extracts from M. Armand's speech.

(1) Set up in 1953 following proposals adopted at a European Inland Transport Conference called by OEEC, the predecessor of OECD.

It is very encouraging — and there are many encouraging factors in this matter — that a high proportion of young people are to be found among those who are studying transport economics.

This science, which is in the process of winning its spurs, is essential at government level; I almost said "above all" at government level. Any transport undertaking, national or European, in fact needs criteria and norms. We can therefore readily understand that the new schools of transport economics must be developed for the benefit of governments and communities. But we also need doctrines for the teachers, because they are not all under 45 and it is essential that their knowledge should be refreshed. Economic doctrine is also necessary to those in the transport industry, and perhaps even more to users and trade unions. The transport unions are among the most important in the world. Neither unions nor users should try to glean at random among transport theories those elements which seem to them to be a theoretical justification for their own interests. They must be able to listen at school, on the benches of the faculties, or in advanced training courses, to certain verities concerning transport which must be established as incontrovertibly as accounting verities.

We vitally need renovated, realistic and undisputed teaching in transport matters. I therefore regard the proposed creation of a European Institute of Transport

Economics as fundamental; because the European scale is imperative for transport.

The European scale is imperative for two reasons. The first is that most transport problems are on a European scale. The time has passed when the railways divided their traffic into two parts: respectable national traffic and second-class transit traffic. To create higher transport institutes at national level would be a century out of date.

The second reason is that theory must be very near to practice. But practice is experience; and it would be inconceivable not to profit from the widening of the field of experience made possible by international co-operation, nor to pool the experience thus gained by each of us. The problems are the same everywhere. These identical difficulties should be pooled; that is the first step towards enriching knowledge before making it a science.

Moreover, a European school, if it were set up, would very soon have many occasions for practical application throughout the world; it might well interest the United States, since the diversity of Europe would enable us to carry economic investigation further than

THEORY AND PRACTICE IN TRANSPORT ECONOMICS

they have been able to do on the other side of the Atlantic. One of the first tasks of the European Institute would be to define a universally valid terminology, since terms quickly become distorted, especially when they cross frontiers.

There is one question which the experts present at the Symposium did not answer, concerning the public service role of certain carriers. The problem of public service is a very curious one; it was formerly regarded as essential, whereas now we hardly ever talk about it. In contrast, the United States is undergoing the reverse experience, and, after long having been unaware of it, has been compelled to face it: the American road authorities, for example, in some cases pay the railways to provide suburban services.

This problem must be dealt with at long range, and we must ask ourselves what the public service should be in the society of the future. Obviously, it will not be the public service of a society suffering from a transport shortage. This problem can only be studied in a permanent Institute where the details of the future are gradually worked out.

Another of the objectives to be given to the European Institute of Transport Economics should be the coupling of pure and applied science. Obser-

vation means statistics. Much has already been done to standardise statistics, but I think that further progress could be made. But while we certainly need statistics, we do not need too many — and the definition of useful statistics should be the task of the Institute.

These statistics should, of course, be compiled with the help of the industries concerned. Excellent things can be achieved in this field, and I should like to quote an example. I had occasion to speak to the European Conference of Ministers of Transport about the value of uniform numbering, for the goods wagons circulating in all the European countries, in order to facilitate mechanical data-processing of statistics. The problem was tackled courageously by all the railway networks; in a single year we persuaded all the networks from Lisbon to Vladivostok to adopt the same twelve-figure numbering for all goods wagons. The task was not easy, but it was crowned with success.

I have said that applied science is made up of observation and experience. While observation is a matter of statistics, experience is the systematic exploitation of all experiments and all observations. Much progress could be made if our experience were exploited in common. The European Institute will therefore have to engage both in research and teaching. It will improve its teaching through research.

The industrial organisations will certainly have an essential role to play in advancing econometrics. But a very great danger lies in the practical application of economic theory: each form of transport wants to make use of theory in order to defend its own interests. In other words, the risk of theories becoming purely national is augmented by the risk of application becoming selfishly industrial. This must not be allowed to happen. European unity is a reality and so is the unity of transport economics. Since magnitude is a matter of applied economics, there must be a general mentor to prevent theories being used as a basis for propaganda which distorts them and halts their progress.

But it is no longer possible to isolate transport economics from the other factors of evolution. These factors are of two kinds. First there is the technical impetus, technical discoveries. It is these which lead to progress. There is also the construction of human society, since transport is not an end in itself. Thus the new type of transport economics which we have to construct for Europe must not be situated solely on the intellectual plane; it must be flanked by the study of technology. Technology will in some sort be situated upstream. Downstream, there will be sociology. So transport economics will be studied in the European Institute at the same time as the prospective technology of the means of transport and prospective sociology.

Obviously, technical data can completely change the transport problem. In the absence of adequate prospective technology, the economists run the risk of constructing a transport theory valid for the steam locomotive age when carriers are at grips with helicopter problems. It was in this way that pipelines suddenly appeared in a world which had hardly foreseen them.

There are many examples of this state of affairs. The most extraordinary is perhaps that of the motor-car, which, in the minds of its inventors, was a manifestation of individual freedom. Today, the motor-car is increasingly conditioned by traffic-lights, which are the real robots governing the cities. The evolution is very fast. But many other forms of evolution will see the light, and it is essential that, side by side with economists, the Institute should provide a permanent home for those who are thinking of technical evolution.

Technical evolution may be divided into two parts. First, there is the evolution resulting from the invention of new devices such as vertical take-off aircraft, hovercraft and other flying carpets. These are instruments.

But in the second place technical changes will particularly improve organisation, thanks to what we call cybernetics — computer forecasting — which should completely transform the means of transport. For urban transport, cybernisation seems to be the only possible solution to the problem, so that taxis and buses are informed of the transport requirements waiting for them. More generally speaking, an immense field is now opening concerning information in relation to the means of transport.

It is very possible that one day the optimum return on the motor-car and the general interest may necessitate transshipment so that lighter vehicles are used for terminal runs in order not to deteriorate the less well-surfaced secondary road network. Who could have predicted such an evolution of the “door-to-door” principle underlying the use of motor vehicles? It is certain that the great principles can vanish one day because someone has finally learnt to make a calculation.

There is another principle of modern technology : mass-production. The low manufacturing cost of a motor-car is due to mass-production further up the line. Ton-kilometres on a main railway line or a major waterway are mass-produced ton-kilometres : their cost is low. But will the maintenance of roads one day justify mass-production? That is not certain. Thus, on a twenty-five year scale, the cost of construction may be completely overturned by the cost of maintenance. Should not such a prospect be taken into account at once, today?

I have given a few examples of this philosophy of the technical evolution of transport which we should work on “upstream” in order to provide the econo-

mists with material. What should be found “downstream” is even more important.

Downstream, there is sociology, and the impact of sociology on economic study is fundamental. It is rather as if human society had successively passed through three stages of development : technical, economic and sociological. We can therefore say that sociology, in the future, will certainly constitute the essential moderator of economic theory.

The old world was distinguished by a transport shortage, whereas transport will no doubt be in surplus tomorrow and in any event sufficient to satisfy the requirements of all kinds that will arise. Our frame of reference in assessing the overall value of economic equipment and structures should therefore be the society not of yesterday but of tomorrow. Other factors must be taken into consideration which are nearer the “human” level than those which alone are taken into consideration today : these are the factors which are derived from sociology.

We are beginning to ask ourselves whether the “time gained” factor should not be taken into account in calculating the economic return in the construction of motorways, level crossings and suburban service facilities. The British, for example, seem to want to take it into account in the construction of motorways.

Yesterday, transport was expensive; today, it is one of the cheapest services. This explains why Lorraine, which has its own coal and iron mines, now finds its steel in competition with steel from Genoa, which has to bring its iron ore from Goa in India and its coal from the United States.

It is certain that, like sociological architects, we must construct and refashion a society in which transport is abundant. As sociologists, we must also consider the consequences of excess transport not only at economic level but at human level : thus, when we manufacture ton-kilometres or passenger-kilometres, we manufacture noise as a by-product.

To sum up, the proposed European Institute of Transport Economics would engage both in research and teaching. It would found its programme of work on the solid basis of technology and on vast sociological views in the European tradition, which is well adapted for that purpose. Between the two technical and sociological poles, economics would no doubt comprise three branches : a theoretical branch fed by young, progressive brains; a policy branch which would raise the real problems; an applied branch, finally, which would be responsible for econometrics and would work in liaison with the industrial organisations.

The proposal to create a European Institute of Transport Economics seems particularly opportune in a Europe whose construction must go hand in hand with the rejuvenation of structures.

CURRENT PROBLEMS

An understanding of the economic problems of one country may vary in the surrounding circumstances and even in the nature of the problems. The OECD's Economic and Development Review Committee bears this in mind in its country surveys. The following is based upon the Country Survey of Austria.

THE PROBLEM

How to transform a small capital market dominated by government issues into an effective instrument for financing industrial investment.

THE SITUATION

The Austrian capital market is small and for equities almost non-existent. The value of securities outstanding at the end of 1962 was equal to only about 90 per cent of the value of that year's investment (compared with 600 per cent in the US for securities listed on the New York Stock Exchange alone). Most of these were fixed-interest securities: equity capital has amounted to less than 1 per cent of new investment in recent years.

The capital market is dominated by public and semi-public issues — about two-thirds of all new issues in 1961-63.

In terms of the savings at their disposal, purchases of securities by both private and institutional investors are low in Austria. Private savers keep a large portion of their savings in relatively liquid form, including savings deposits, which are almost as liquid as demand deposits and this, among other things, acts as a brake on security purchases by banks. The shortage of long-term funds is reflected in relatively high interest rates and steady borrowing abroad.

The cost of raising equity capital on the market is high, and most companies finance their invest-

ments by ploughing back profits or borrowing from banks (an alternative that does not exist in most OECD countries).

BACKGROUND

To a great extent the failure of the Austrian capital market to develop can be attributed to a complex of controls, regulations, taxation policies and deep-rooted traditions. Among the specific factors that have been cited are the following:

- Institutional investment is strictly controlled: life insurance companies can, in effect, only buy Federal bonds, mortgages and electric-power company bonds. Savings banks must have the express permission of the Minister of Finance to purchase securities.
- Some features of the tax system deter trading in industrial shares. For example, distributed profits are subject to both corporate and personal income taxes. There is an issue tax on industrial bonds and shares and a tax on conversion of reserves into equity capital.
- The high level of self-financing, in part a result of the undeveloped state of the capital market (it makes capital issues costly), also tends to perpetuate this state. Profits have been high during the post-war years; some observers feel that the use of profits for investment has prevented companies from having a more generous dividend policy, and that higher dividends might have stimulated the demand for equities.

The capital market problem has been constantly in the fore of public discussion during recent years. Various programmes for overcoming the problem have been worked out, and a comprehensive set of proposals for new legislation was drawn up in 1962.

MS AND POLICIES

provide valuable insights into those of another, despite differences problem itself. The solutions found may also be highly relevant. fact in mind in making its annual surveys of each Member country's Austria for 1964.

Two bills of limited significance have been passed so far, and the Government was asked last year to work out a new set of proposals.

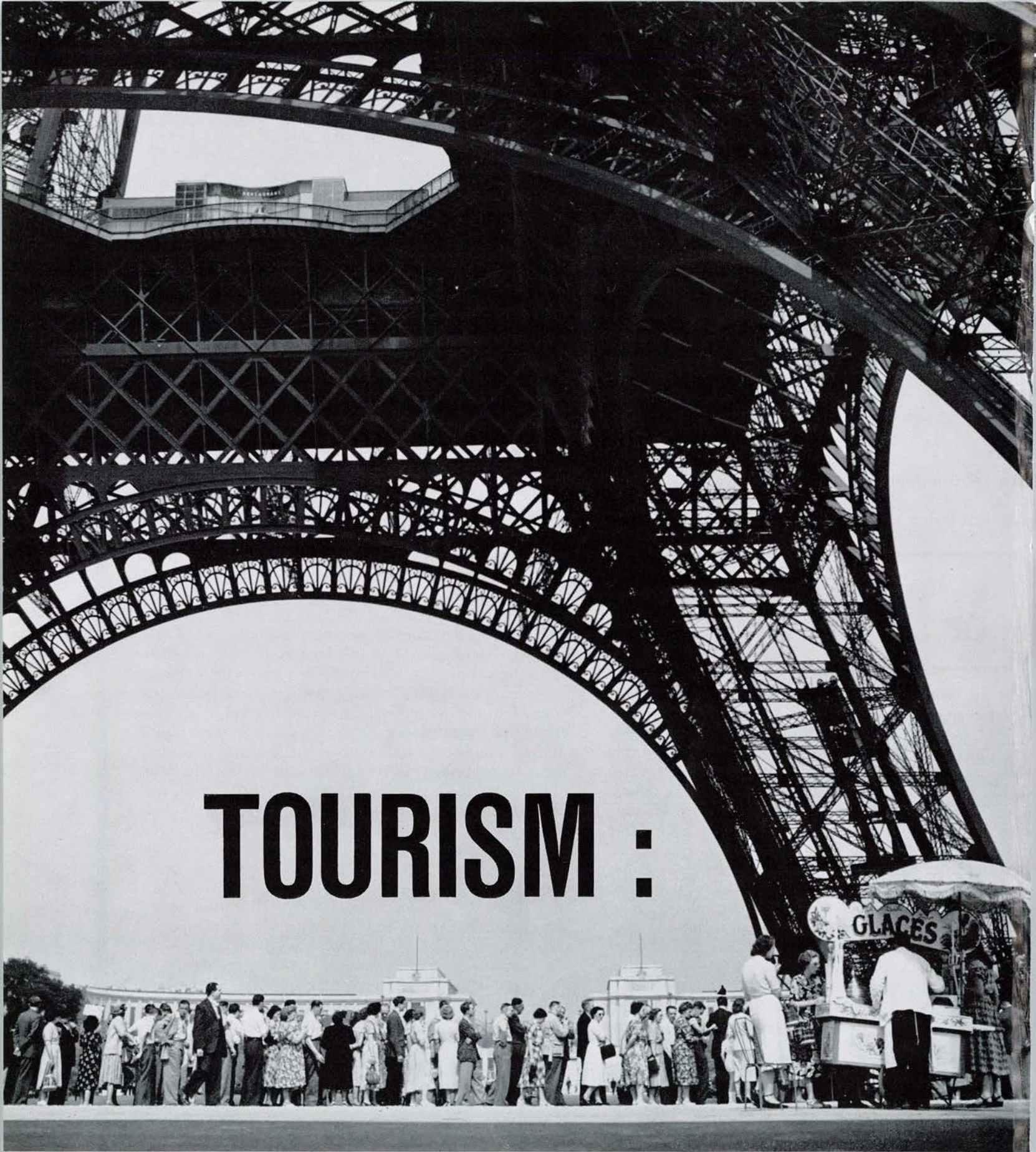
COMMENTS OF THE COMMITTEE

It is important that progress should be made towards overcoming the existing difficulties. First, from the point of view of international payments equilibrium, it is clearly undesirable that a country with a fairly persistent current external surplus should attract long-term capital from abroad, entailing a continuous increase in its foreign exchange reserves. Second, the increase in domestic liquidity resulting from the external surplus has at times been an important source of inflationary pressure. Moreover, an expansion of the domestic capital market should have favourable effects on the allocation of savings and should exert downward pressure on interest rates. There is little doubt that the efficient functioning of a capital market depends to a great extent on its size and therefore on the supply of savings put at its disposal.

A revision of the often excessively strict conventions governing investment by institutions could help to increase the supply of savings. The "monopolisation" of the capital market by public authorities, or rather by the Federal Government and electric power companies, is perhaps the most frequently criticised feature in the current capital market in Austria. The public authorities ensure that their market requirements are covered by tax discrimination in favour of holders of certain types of their bonds and by control of market issue activity. These are exposed to heavy criticism in some quarters.

At one further remove, however, it may well be asked whether doing away with the special instruments enabling the Government to cover its market requirements would be sufficient to bring lasting relief in the capital market. A reconsideration of budgetary policy and in particular of ways and means of reducing the large Federal budget deficit (1.9 per cent of GNP in 1963) is certainly relevant.

The virtual non-existence of a money market has recently been brought to the fore in discussion of the capital market. It is strongly felt in Austria that a properly functioning money market is a necessary condition for an efficient capital market. This is clearly a very relevant approach. A developed money market would enable the Federal Government to cover part of its financial needs by the issue of Treasury bills, thereby bringing relief to the capital market. For the other sectors of the economy, Treasury bills would constitute a convenient outlet for short-term investment. The shift of emphasis away from particular rules and regulations to more basic problems like those of budget financing clearly indicates the wider approach to the capital market problem adopted in recent years. Whether special measures are called for to stimulate the supply of risk capital is less certain. The small volume of risk capital in the Austrian market may just as well reflect low demand for it as reluctance on the part of investors to enter the equity market. In part the small equity volume can be attributed to the structure of ownership and the form of business organisation. In Austria the private joint stock company is less common than in most other OECD Member countries. Nationalised industry, owned either directly by the Government or by the nationalised bank, weighs fairly heavily in the industrial sector. (The possibility of allowing nationalised industry to issue non-voting shares in the open market is under discussion). Family enterprises are also frequent, as are other kinds of non-stock companies.



TOURISM :

a record of improvement

A foreign tourist is officially defined as "any person visiting a country, other than that in which he usually resides, for a period of at least twenty-four hours". Otherwise he is considered to be an "excursionist".

Why he tours about from country to country is usually for reasons of pleasure or recreation or health. But it could be for sports or family matters, or he might be on a religious pilgrimage. Another complementary objective may be intellectual or cultural improvement. Even people on business trips are classified as tourists.

The definition, accepted by OECD's Tourism Committee, was recommended by a committee of the old League of Nations in 1937. It is probably more useful today because of the phenomenal number of foreign tourists and the enormous sums of currency they contribute to this growing industry. The number of foreign tourists reaches into many millions each year, and the income from international tourism is calculated in billions of dollars.

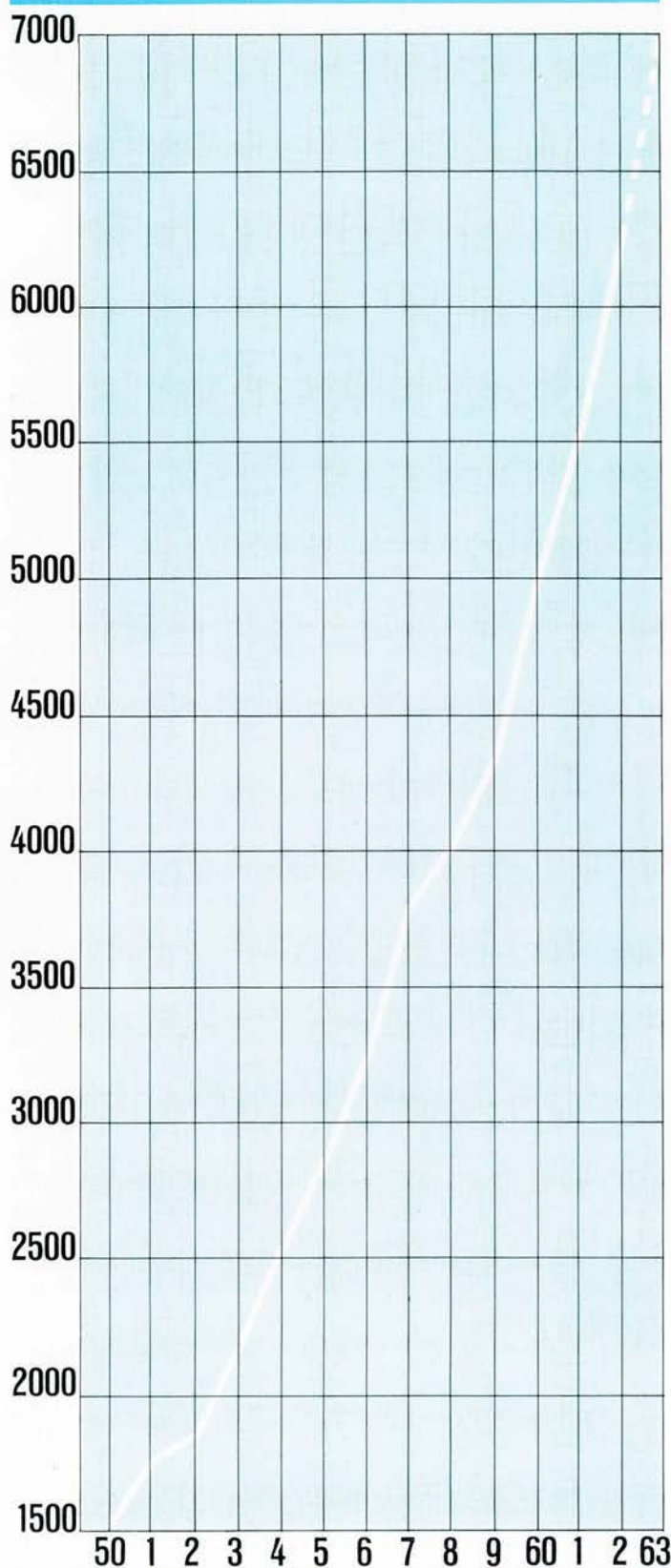
In 1950, when postwar recovery in most European countries was well under way, foreign tourist arrivals in countries that were members of the Organisation for European Economic Co-operation, the precursor of OECD, numbered approximately thirteen million. The statistic is impressive in view of the foreign currency restrictions prevalent at the time. This total includes the visits made to various European countries by some 300,000 tourists who came directly from the United States and whose spending helped reduce the dollar deficit hampering international trade.

By 1958 the total reached an approximate 31 million for European Member countries. In 1962, by which time the United States and Canada had become members of OECD, something like 68 million foreign tourist arrivals were recorded in Europe and North America — 52 million and 16 million respectively.

In 1963, foreign tourist arrivals in European Member countries increased by 8 per cent over 1962, when a similar increase was recorded over 1961. Although the percentage increase in Italy was small (2.4 per cent) the country still reported the largest number of foreign tourist arrivals at frontiers in 1963 with the total of 10,600,000. This did not include over twelve million excursionists. Spain was very close behind with about 8,800,000 foreign tourist arrivals, an increase of 23 per cent over 1962. This, in turn, did not include over one million Spanish nationals residing abroad who visited the homeland, and 1,113,000 foreign excursionists.

Some European countries report the nights foreign tourists spend in hotels. For fourteen of these, including Yugoslavia, which is often associated with OECD programmes, nearly 183 million nights were recorded, an overall increase of five per cent over

TOURIST RECEIPTS OF OECD MEMBER COUNTRIES EXCLUDING JAPAN (in million dollars)



1962, about half the rate of preceding years. This figure was affected by the huge increase in camping holidays, which naturally has its effect on hotel returns.

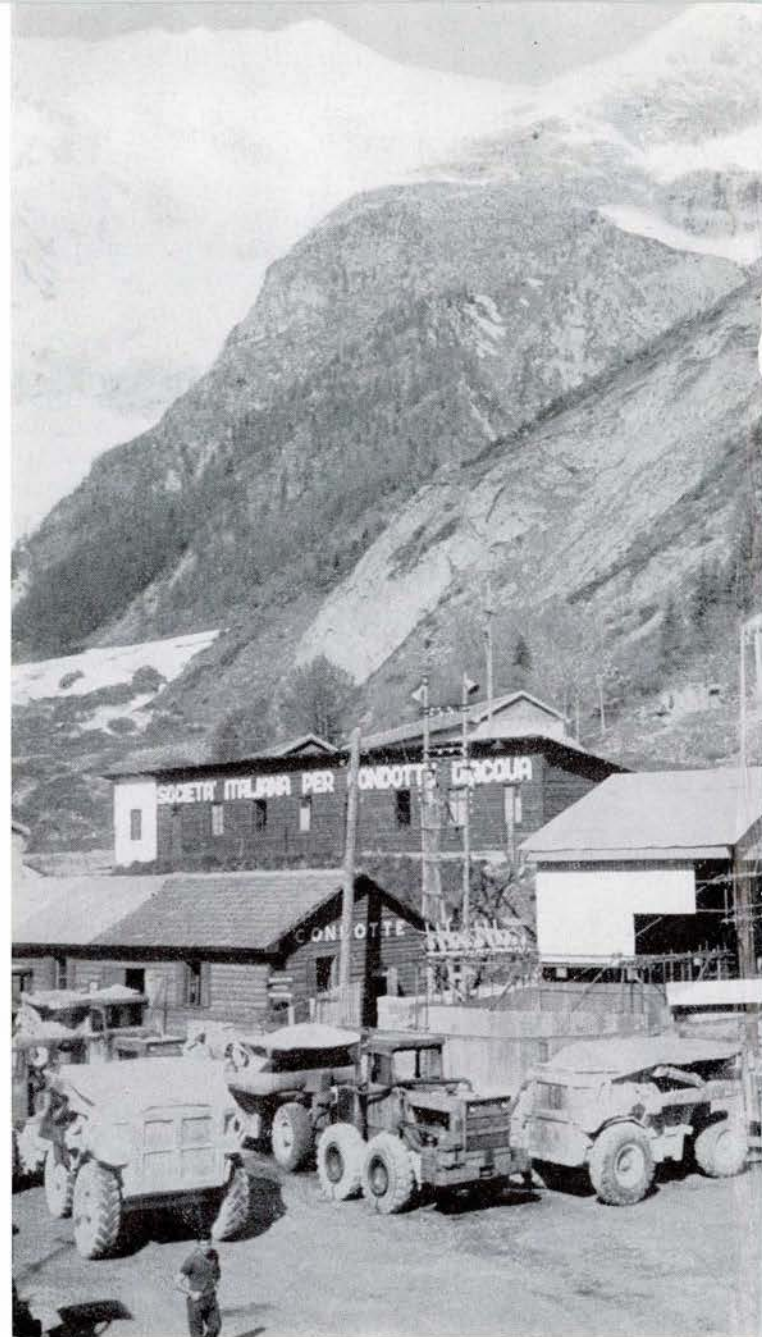
The six million foreign tourist arrivals in the United States in 1963 represented an increase of about four per cent compared with 1962. Of these about five million were Canadian. The number of tourists from OECD European countries was 352,000, an increase of about 13 per cent over 1962. Foreign tourism in Canada remained about the same in 1963 and 1962. The tourists comprised mainly United States citizens — around ten million each year.

Although the overall rate of increase in 1963 over 1962 may have slowed up somewhat, it was still a steady gain for almost all OECD countries and early fragmentary reports for 1964 indicate a year in which new records will be achieved. During the first five months of the year foreign tourist arrivals at frontiers showed spectacular increases for several countries: 58 per cent for Portugal; 36 per cent for Spain; and 17 per cent in the United Kingdom over a similar period in 1963. During the same period foreign tourist arrivals at hotels rose by 18 per cent in Austria and 17 per cent in Switzerland. For the first half of 1964 the number of overseas visitors to the United States totalled 411,000, an increase of 24 per cent over the first half of 1963.

Perhaps a clearer picture emerges from estimates of the total money spent. For eighteen Member countries the income from international tourism was \$ 6,100 million in 1962 and \$ 6,900 million in 1963, an increase of about 12 per cent. From the economist's point of view, tourism is one of the most important single items in international trade. No longer a stop-gap for dollar deficits, it provides important support for countries in the process of modernising their economic structure. For most Members it is a favourable influence on their balance of payments; for others a problem to be solved.

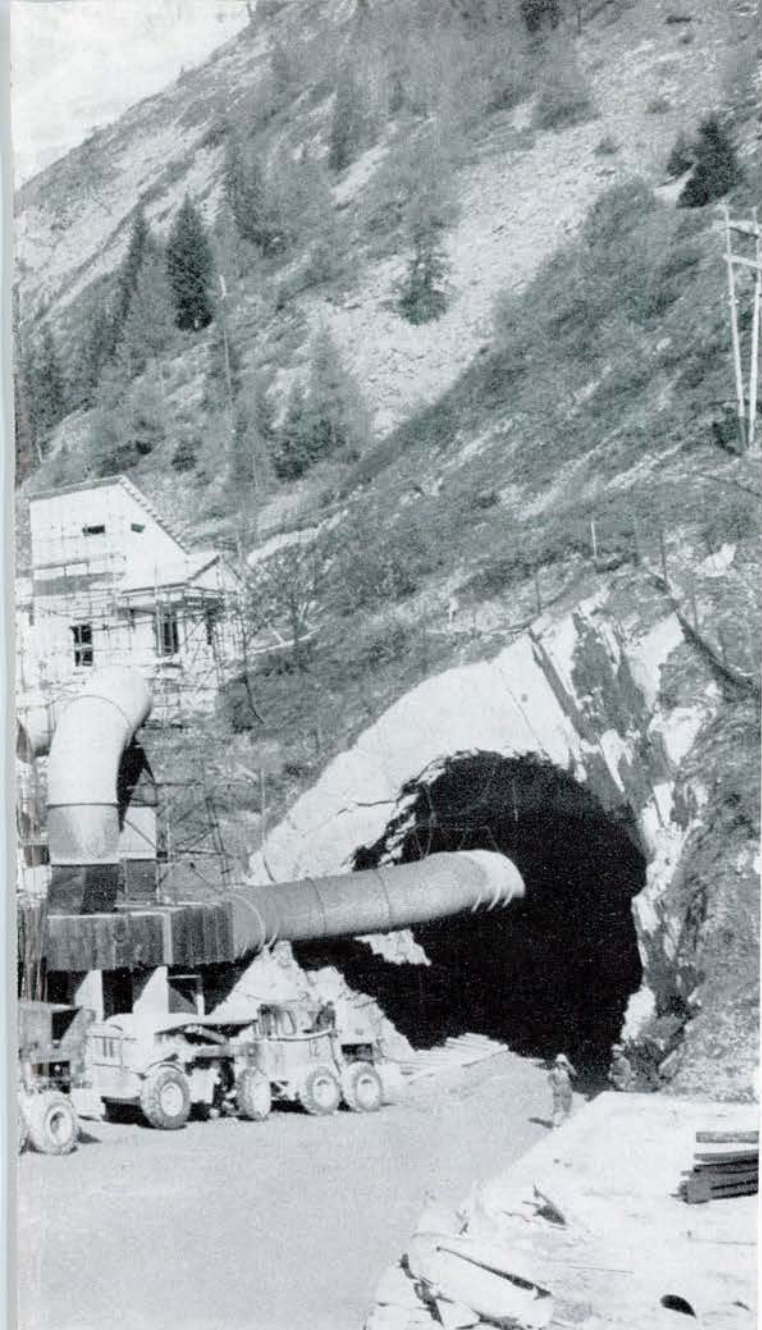
In 1963, to take the latest year for which statistics are available, surpluses were recorded for Italy (\$ 749 million), Spain (\$ 611 million), Austria (\$ 314 million), Switzerland (\$ 253 million), France (\$ 121 million), Ireland (\$ 77 million), Greece (\$ 67 million) and Portugal (\$ 42 million). With the exception of France, the surpluses exceeded those of the previous year.

In the same year a balance of payments deficit on account of international tourism in the United States was \$ 1,136 million, an increase over the 1962 deficit of \$ 1,022 million. A deficit was also recorded in Germany of \$ 586 million, but this was less than the 1962 figure (\$ 630 million). On the other hand, as in the United States, the deficit increased in the United Kingdom (from \$ 54 million to \$ 128 million), Belgium, Sweden and Turkey.



The growth of international tourism during the postwar years was not left altogether to chance. Although individual countries found ways of improving their share of the industry by publicising their attractions and making touring less hazardous or difficult, more effective measures were found through international co-operative action — a principle worked out by OEEC and its successor, OECD, for economic expansion and international trade. In 1949 OEEC established the Tourism Committee and gave it the task of studying tourism problems and offering solutions that would benefit all Member states involved in the enterprise.

One of the Committee's main tasks today is to spot trends so that Member countries, now in keen competition with each other, can prepare for and take advantage of the evolution in the industry. The findings are passed on in an annual report. An outstanding trend in recent years is the growth of tourism in Mediterranean countries. This is made possible by the increased mobility of the tourist.



Construction of motorways and tunnels as an aid to tourism : the Mont Blanc tunnel will be open to traffic this year.

Airlines, bus companies and railways all offer special facilities. The number of privately-owned cars in European Member countries, which was over 28 million at the end of 1962, having doubled, and in some cases tripled, in number during the preceding ten years, has considerably increased since then. At peak periods they all seem to be on tour at the same time. It is not irrelevant, especially for countries like Greece and Turkey, that tourism by yacht is also on the increase.

Tourism in the Mediterranean area broadens the choice travellers have for spending holidays. As a rule tourism here is a recent development and accommodation tends to be more available and often more modern. Above all, costs are lower and this has created a new kind of tourist — the bargain hunter. Lower rates appeal especially to the youth groups and the lower income bracket families — now clearly the majority of tourists. The relative certainty of a favourable climate and easy access to water and other sports are additional decisive elements. These

are among the reasons underlying “the growing success in Spain, Portugal, Greece, and Yugoslavia”, as the Tourism Committee reports.

Among major improvements, advocated by OECD and undertaken by various Member countries, is the reduction or abolition of customs formalities and border procedures. The demand for entry visas was always a trying point for would-be tourists. The time, money and red tape needed to get this document was dissuasive. As a result of an OECD Council decision, all European Member countries have abolished the visa formality. No visas are requested by Canada for tourists from OECD countries staying three months or less. Although the United States still requires visas, they are easily obtained from any consular post by mail and without charge.

More recently, some countries have removed the need for passports (identity cards being a substitute). In Europe, customs inspection of luggage has been considerably simplified. In the United States, the old written declaration of articles a tourist had in his luggage has been eliminated at international airports for all except those carrying articles exceeding the franchise.

Following an OEEC Council decision in 1955, Member countries agreed to free tourist information and promotion materials from import duties. Since then the growth of this by-product of the tourist industry has been remarkable. Expenditures on advertising and publicity are now reaching into millions of dollars.

In the early postwar years the amount of currency a tourist could take out of his country was severely restricted. Today, through actions taken by the OECD Council, most Members have liberalised the amount to a figure of \$ 700 per journey and some have removed the ceiling altogether.

Improvements in accommodation for international tourism have been made and continue to preoccupy most Member countries. In 1963 especially, Member governments advanced programmes of construction and modernisation of hotels and other lodgings.

Examples of large-scale expansion include the plans France has for developing ten Mediterranean resorts on the coast of Languedoc and Roussillon. They will accommodate 800,000 visitors. Norway has established three tourist pilot areas relating to accommodation, especially among its fjords. In Italy nearly 35,000 new rooms, 32,500 of which with

baths, were built in 1963, mainly in third- and fourth-class hotels and boarding houses.

A recent trend in accommodation is the growth of capacity on camping grounds or tent villages. Partial reports for 1963 indicate an increase of 27 per cent in Belgium and 23 per cent in Italy. A random selection of figures for nights spent by foreign tourists on camping grounds estimated nearly two million for Germany (up 15 per cent), 2.6 million for Norway (20 per cent increase), 4.3 million in Spain, and 7.2 million for Italy.

However, statistical censuses for camping and caravanning (car-trailers) and rentals of rooms, flats and holiday villas are far from realistic. Many camping sites could stand improvement in facilities, and for this reason certain governments are today considering methods to bring them under control of public safety and health departments.

Important and favourable changes have been observed in tourist transport facilities. Outstanding was the reduction on trans-Atlantic airline fares. In the early 1950s, air transport companies developed "tourist-class" fares and found a growing number of takers. In 1963 trans-Atlantic airline companies increased the capacity for economy class travel by 14 per cent and recorded an increase of 8 per cent in the number of passengers in this class. Today's popular club-sponsored charter flights are an additional achievement in widening the base of tourism. In 1963 charter flights crossing the North Atlantic (not to mention the numbers within Europe) carried 414,000 passengers — an increase of 31 per cent over the preceding year. Of the two million American tourists going overseas in 1963 in all directions, 84 per cent went by air. International air transport returns in Europe continued to show upward trends; passenger traffic through airports rose by 13 per cent in 1963. Singularly impressive was the passenger traffic at one airport — Palma Airport in Majorca. The number passing through it in 1963 was 1,270,000, or 23 per cent higher than in 1962 and 52 per cent above the 1951 figure. Patterns of tourism, in numbers and direction, were clearly changing.

The trend towards travel by air has obviously affected traffic on transatlantic shipping lines. Time was when berths were unobtainable during the peak summer travel periods. Today, as business travel by sea has become less frequent and the ocean voyage more a pleasure trip, capacity has been deliberately reduced by many lines. Transatlantic sea traffic itself decreased in 1963 by 3 per cent. But all this enabled shipping firms to divert space to the popular cruise holiday. Ships belonging to the groups of shipping companies known as the Atlantic Conference alone carried 129,000 on cruises in 1963.

All available data for 1963 indicate that visitors preferred the motor car as a means of transport when travelling to neighbouring countries. For much longer journeys the preference was mainly

aircraft for speed and railways for comfort. Thus arrivals in Germany showed 97 per cent by road and rail, two per cent by sea and one per cent by air. In Portugal 59 per cent of foreign tourists came by road and rail, and in Italy the percentage was 71. Arrivals by air, however, were higher in Greece (48 per cent), Turkey (58 per cent) and the United Kingdom (60 per cent).

In stimulating road tourism Member countries are making efforts to increase and improve motorways or auto-routes. By the end of the year the total European network was 6,717 kilometres. Meanwhile, construction of tunnels and bridges on main tourist routes went on apace. The Grand St. Bernard Tunnel through the Alps between Switzerland and Italy, and the Guadarrama tunnel on the Madrid-Coruna road in Spain, were opened in 1963. Work was under way on the Mont Blanc Tunnel between France and Italy, to be opened in 1965. Portugal continued construction of a suspension bridge over the Tagus at Lisbon.

In European countries especially, holidays and vacations for millions of people are determined by traditional factors in education, employment and climate. School terms and examinations determine holiday time for millions. Collectively decided regulations in business firms and industry permit workers to go on holiday at the same time as their children. This often leads to complete commercial closures for a month. The result is massive overcrowding of tourists on highways and resorts, mostly in August.

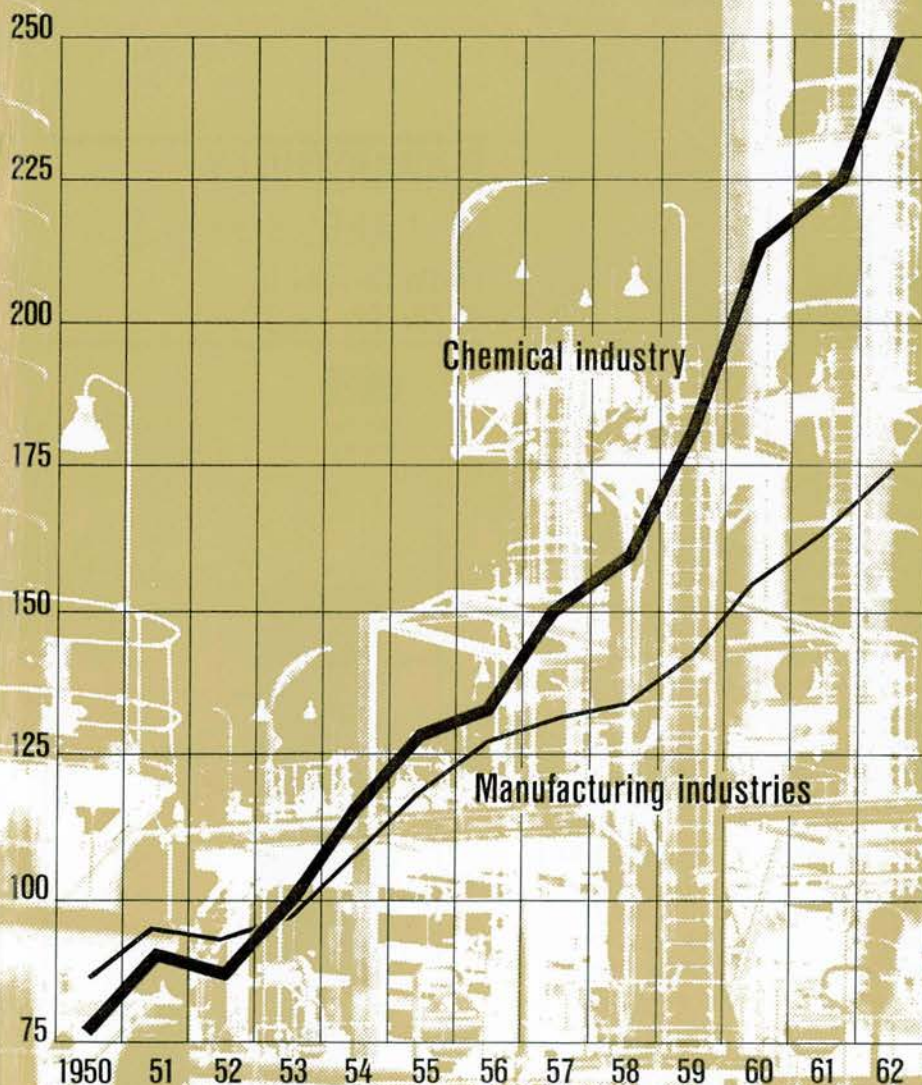
Authorities are considering staggering school terms and thus holiday vacations so that they do not all coincide in a single peak period. France, for one, is to establish two separate school terms and holiday periods for the north and south of the country, starting in 1965. A similar system is already in force in Austria for the eastern and western provinces. Completion of examinations for the General Certificate of Education in the United Kingdom in June rather than July is under consideration.

In industry and other economic sectors a rotation system for employees, retarding or advancing holidays, is among measures advocated in solving the bunched-up holiday period. In France, as an outstanding example, only half of the public servants will be allowed to take holidays in August from 1965 onwards. Thought is being given to moving the dates of certain public holidays. The United Kingdom has decided that for 1965 and 1966 the August Bank Holiday will be moved from the first to the last Monday in the month.

These improvements are expected to make transport in tourism less burdensome, roads less jammed and accommodation more available, and so less expensive. Lengthening the holiday season through staggered vacations will undoubtedly benefit both tourist and industry alike

CHEMICAL PRODUCTION:

profile of a growth industry



INDICES OF PRODUCTION FOR EUROPEAN MEMBER COUNTRIES OF OECD (1953 = 100)

Europe's chemical industry has grown more rapidly during the last twenty years than any other large branch of manufacturing. OECD's Special Committee for Chemical Products thought it important to find out why and asked Dr. Hans Wittmeyer, the German Chemical Federation's chief statistician, to look into the matter. Some of his more important findings, just published by OECD under the title "The Chemical Industry in European Member Countries of OECD", are summarised below.

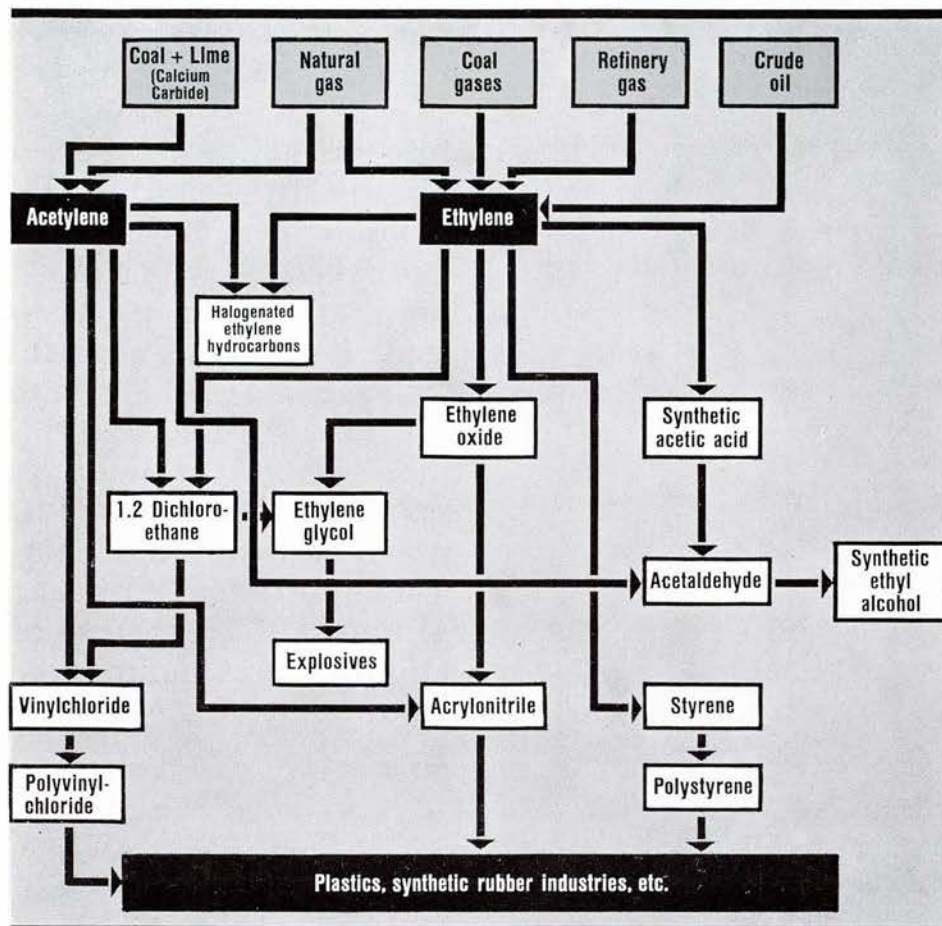
While manufacturing production as a whole rose by 75 per cent during the years 1953 to 1962, the output of the chemical industry moved ahead by 146 per cent and its share in the European nations' GNP rose from 2.5 to 3.2 per cent.

Much of the chemical industry's growth during these years has been based on organic (as opposed to inorganic) synthesis. In the early 1950s most (90 per cent) of organic synthesis used coal as a raw material. But today coal has fallen in relative importance (to about 20 or 25 per cent); petroleum and natural gas have taken its place. Production of petrochemicals in 1962 was 13 times higher than in 1953.

The value added to raw materials in the process of organic synthesis can be very great: a unit of carbon may have its worth enhanced twenty or thirty times.

It is characteristic of organic synthesis that when a given number of

ACETYLENE-ETHYLENE INDUSTRIES



elements interact, they yield a greater number of products, each having its own distinctive properties. For example, the reaction between chlorine and methane produces five quite different substances, some in large, some in small quantities. Chlorine and liquid benzol can yield as many as seven substances. Even a single substance can be made to take on quite different properties through such processes as polycondensation or polymerisation, which change the size of the molecule.

This is true at each stage of the production process, with the result that the variety of potential products is virtually infinite as are the uses and possible outlets. New products are constantly being introduced.

The versatility of some of the end products of organic synthesis makes the market for them great in scope. Plastics, for example, which have been an important factor in the recent growth of the chemical industry, are used in such diverse branches of industry as construction, engineering

and many kinds of manufacturing. Since 1953 plastics output has grown 450 per cent.

There are, moreover, alternative ways for making products with similar properties. The fact that chemicals created early in the process of organic synthesis can be used in many different ways gives the industry great flexibility as to choice of both product and process.

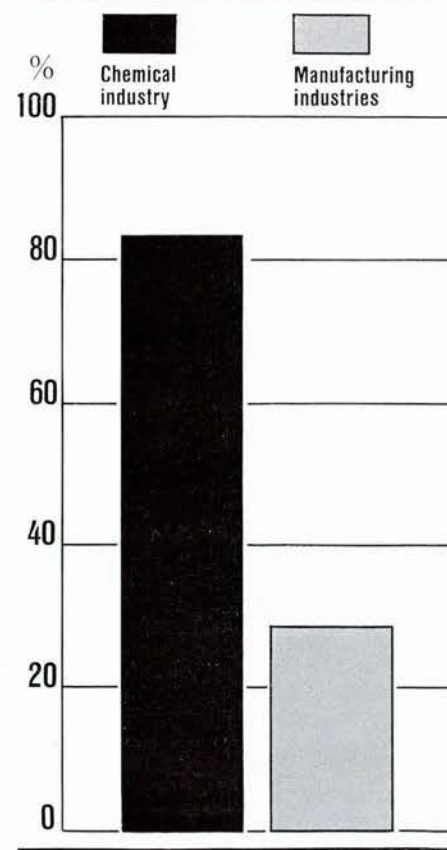
Another key to the dynamism of the chemical industry : production of a desired chemical may give rise to large quantities of a by-product. The very existence of the by-product in turn sets up a pressure within the production system to find a use for it. It is not unusual for the by-product to become more important than the original substance. An example : in order to obtain by electrolysis the caustic soda required to meet demand some years ago, manufacturers were forced to produce about seven-eighths as much chlorine. The problem was to find an outlet for the chlorine, a highly corrosive gas which cannot

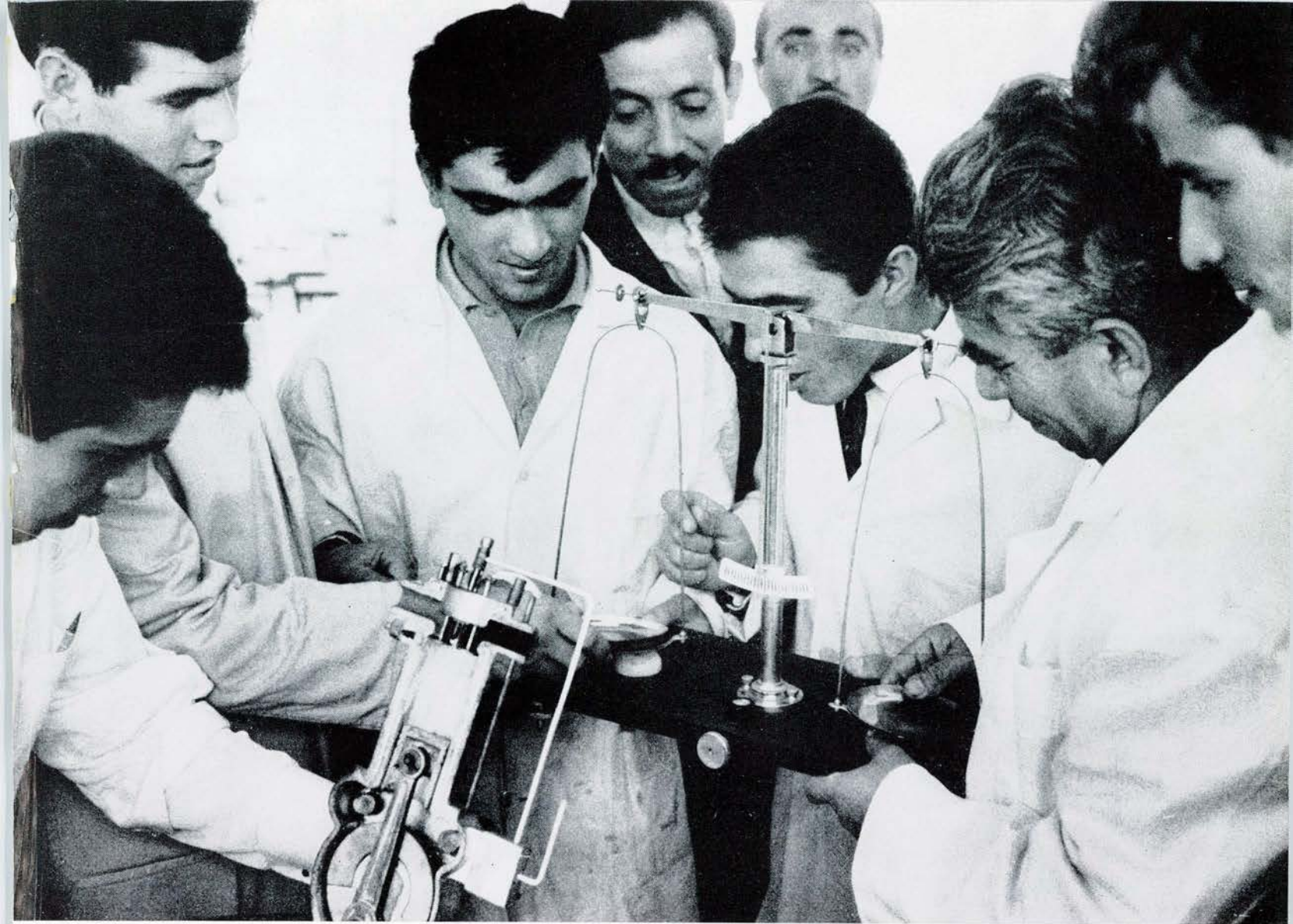
be stored for an unlimited period. So successful was the attempt that today the problem is reversed. Chlorine is in great demand for solvents and plastics, and outlets must be found for the large quantities of caustic soda which are necessarily produced at the same time.

The pressure for new products comes not only from within the industry but from customers — industrial as well as private consumers. The interaction between consumers and producers is unusually intense, and frequently suggestions will be made or needs expressed which prompt manufacturers to alter existing products or produce new ones.

Although the amount of capital required is high (as are research development and marketing costs), so is labour productivity. In 1961 value added per worker came to \$ 5,900 as against \$ 3,000 for manufacturing as a whole. More significant, productivity has been growing more rapidly in chemicals than in the average manufacturing industry.

PRODUCTIVITY OF LABOUR FORCE - GROWTH RATIO BETWEEN 1953/1961





Instruments produced by the Centre undergo rigorous inspection before distribution to schools.

TRAINING TURKISH YOUTH FOR FUTURE SCIENTIFIC NEEDS

An example of fruitful international co-operation in a practical field of education was highlighted when the Turkish Prime Minister inaugurated in Ankara the Centre for the Production of Science Teaching Instruments, which was founded as a means of expanding scientific and technical training to meet the demands of Turkey's economic growth. The object of this OECD-initiated pilot activity is to show developing countries, particularly those with a shortage of foreign currency to purchase adequate supplies and no scientific instrument industry, how to overcome the lack of laboratory equipment and raise the standard of science teaching in their schools. A similar project is nearing completion in Greece.

The problem of training the requisite numbers of scientists and technicians in an expanding economy is one which is not peculiar to Turkey. Among the basic causes in many Mediterranean countries are a shortage of teachers and the absence of science teaching equipment. It was evident from an educational survey of Turkey that the relatively few qualified personnel emerging from the higher institutions reflected the inadequate training at primary and secondary school level and it was

This article was contributed
by Edgar KENNEDY
Consultant to the Directorate
of Scientific Affairs of OECD

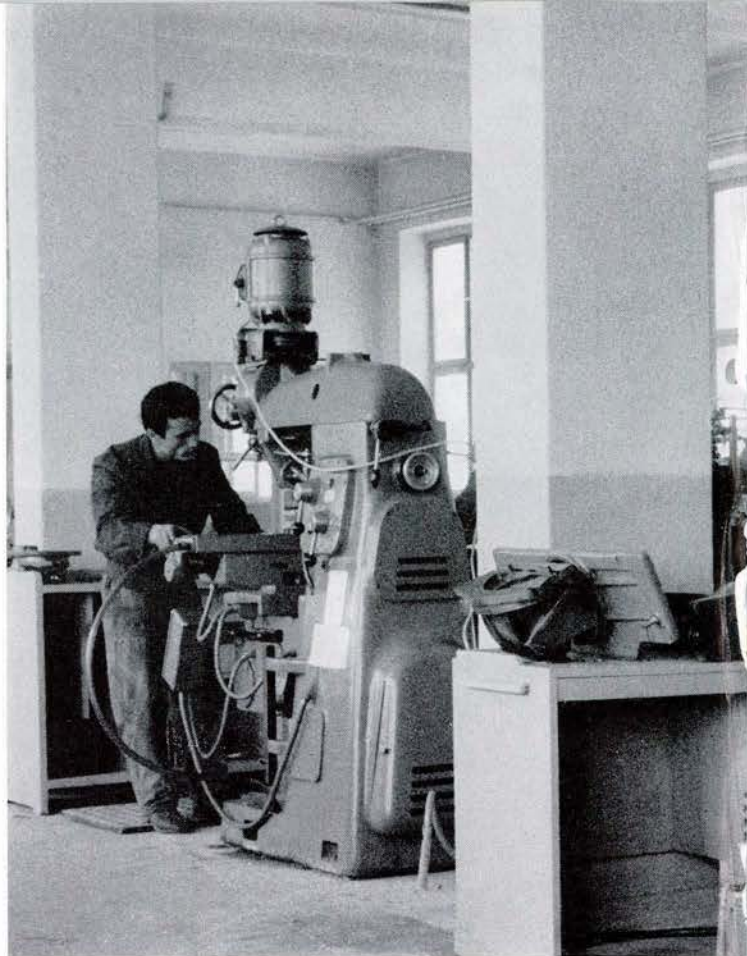
decided that in these areas the Directorate of Scientific Affairs of OECD might usefully assist. Among the several courses of action indicated to redress the situation was a plan for equipping schools based on a national centre for producing essential items of science equipment.

In July 1961 an Agreement was signed between OECD and the Turkish Ministry of Education, by which the Organisation accepted a Turkish proposal to establish such a Centre in Ankara. Preliminary studies, by OECD experts, confirmed that more than 15,000 primary and some 300 secondary schools in Turkey "have no science teaching equipment whatsoever". Moreover, it was revealed that in those schools equipped with science instruments from abroad the repair and maintenance of this equipment was handicapped by the lack of foreign currency to purchase replacements for damaged parts. In other schools, new instruments, unused by teachers or students, reposed in glass cases like museum pieces. There was also noted a reluctance on the part of science teachers to demonstrate principles to students on apparatus with which they themselves were unfamiliar. Only in a few schools was there enough apparatus to enable the students to carry out experiments. In most, instruction was necessarily confined to demonstrations by the teachers or to diagrams and charts. The conditions described in the Reports were hardly calculated to arouse much interest in science students.

In collaboration with the Turkish authorities, a Joint Committee was formed of Turkish educational and technical experts and representatives of the OECD Scientific Affairs Directorate. Following hard on curriculum reform measures in the teaching of the natural sciences, the Joint Committee compiled a list of instruments to be manufactured for instruction in science, based primarily on the concept of simplicity and economy. It was also planned that the Centre should produce the apparatus on the list in quantities to equip, initially, the primary and secondary schools on a scale consistent with the demands of the revised science syllabus. Equipment for higher institutions and for research was to follow at a later stage.

In addition to providing expert advice and technical assistance in developing the project, OECD undertook in the

Prime Minister Ismet İnönü examining science teaching equipment produced by the Centre.



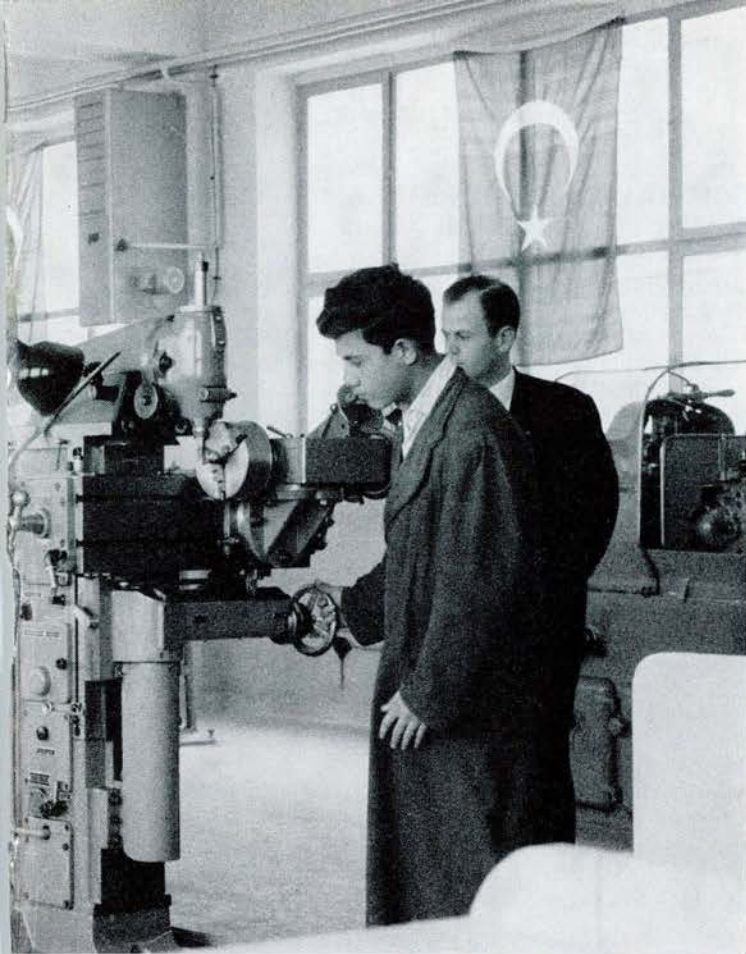
Agreement to contribute one-quarter of its cost towards acquiring outside Turkey the machines and equipment necessary for the functioning of the Centre. Shortly after the signature of the Agreement a list of machine-tools and up-to-date equipment was jointly drawn up and orders despatched; a work-flow plan was agreed; models of the required apparatus constructed and type and quantity of raw materials established.

Ground was broken for the new Centre in December 1962, and by January 1964 a building housing all the operational elements of the Centre reached completion.

Basically, the Centre is an industrial unit and its products are diverse laboratory equipment. As it was an experimental project many of the attendant problems were solved empirically. The main workshops are 4,500 square metres in area, and administration and auxiliary services are provided for in a block of 1,500 square metres. In addition to the machine-shops, there are units for glassblowing in which a high standard is reached, for plastics and electro-plating. The close proximity of road and rail permits easy distribution of the Centre's products to schools throughout Turkey.

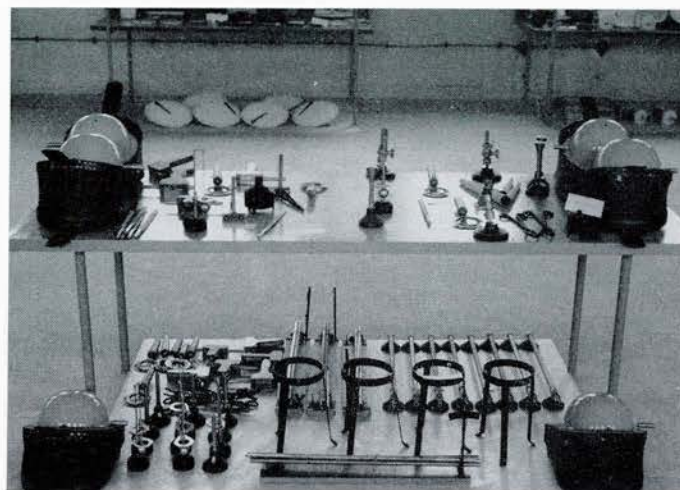
The staff consists of 109 designers, technicians and administrative personnel, many of whom are attached to the Vocational Training School nearby as instructors. Training of the more promising recruits to the staff in the techniques of mass-production was organised by OECD in France for 5 technicians. On their return, an "each one teach one" training escalation programme was followed.

The role of the centre is to establish Turkey's self-sufficiency in scientific instruments for educational purposes. This means supplying, initially, the primary and secondary schools with a total of 218 pieces of apparatus on the list drawn up by the Joint Committee, or 3,335,400 instruments. To reduce



Left : Part of workshop showing some of the machine tools contributed by OECD.

Below : Display of part of the equipment produced by the Centre for distribution to secondary schools.



the operation to more manageable proportions, 30 instruments designated "absolutely indispensable" for teaching physics in primary schools were scheduled for the first production cycle. But the manufacture of even these 450,000 instruments meant a radical departure from the artisan methods then in use if the schools were to be supplied to an acceptable level within the suggested period of 5 years proposed by the Turkish authorities.

Mass production proved the solution. To be economically justifiable, the Centre's output must be such as to produce science teaching equipment at a cost per unit, within the fixed budgetary provisions of the Ministry of Education for this purpose, less than the alternative cost of acquisition elsewhere. Here economy of scale supplied the answer. The demands on the Centre called for an initial output of 960 instruments per day, exceeding the critical by some 300 and rising to 2,130. The last-named figure was to meet not only the requirements of the number of pupils reaching school age, extrapolated to 1967, but also the estimated increase in school attendance by those now of school age — but unable for various reasons to attend — as the economic base of the whole population rises.

According to the First Five Year Development Plan, 1963-1967, published by the State Planning Organisation, Ankara, the Turkish educational aims are to raise the percentage of the school age population in primary schools from 73 % to 100 % in 1977; and in technical schools from 1 % to 4.5 % during the same period. Hence, to meet the demands imposed by the estimated increase under the two heads mentioned, the Centre's production was planned by the OECD consultants to supply the existing schools within three years of the Centre becoming operational.

One particularly important aspect of the Centre, much valued by science teachers, is the Demonstration Laboratory, occupying a wing of the main building, in which courses are

given to groups of 24 science teachers to each session in the use of the complete set of instruments produced for the schools. By familiarising themselves with the up-to-date apparatus, the teachers can face their classes with added confidence. The participation of the students in the experiments made possible by the Centre's output has familiarised them with modern experimental methods.

Adjoining the Demonstration is the Research Laboratory, whose role is to improve continually the design of the apparatus to meet changing needs in the science syllabus, to invent new apparatus and to apply, both in design and manufacture, advances in the field of science teaching equipment.

In a review of the project from the submission of the Turkish request for OECD assistance through the planning to the operational stage, "the importance attached by the Turkish Government to the Centre cannot be measured", stated Dr. Ilhan Ozdil, Director-General of Technical Assistance and Vocational Training of the Ministry of Education, at the inauguration, "only by the estimated saving to Turkey of TL 50 million in foreign exchange. This sum would be needed to acquire the same number of teaching instruments in one year as the Centre will produce. It has also provided the means for Turkey to achieve a higher standard of science teaching without which our economy cannot advance".

It is to be hoped that the potentialities of this venture, the detailed planning and scope of which are described above, will now be fully exploited by the Turkish authorities as an integral part of the implementation of the country's economic and educational plans.

The Centre's contribution to Turkish education underlines its value as an OECD pilot project from which the experience acquired in its establishment might serve Member and other countries faced with basic educational problems.

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During the past twenty years growth has been faster in the chemical industry than in any of the other large manufacturing industries. The OECD Special Committee for Chemical Products therefore decided to have a general study made describing the evolution of the industry since 1953 — the first year in which statistics might be said to be complete and uniform — and pointing to the reasons for the rapid rate of growth. Broadly, the study covers the chemical industry as an economic factor, the role of the European OECD countries in the world chemical industry, foreign trade and domestic supply; it is completed by a number of statistical annexes.

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