



The Taiwan 2000 study

Experiences and impressions

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In September 1988 the final report on the Taiwan 2000 study is due to be published.¹ This article describes the background and reasoning behind the initiative to the study, and some aspects of the results and recommendations arising from the draft report.² Extracts from the report are not presented, as this can only be done after publication, and preferably by experts. Instead, the article is a personal account of experiences and impressions gained through the author's involvement in the setting up of the study.

Taiwan is an island with at present about 20 million inhabitants and an area of approximately 36,000 km² (as a comparison, The Netherlands is 38,000km²). Taiwan was originally part of the Chinese Empire and from 1895 until 1945 was ruled by Japan. In 1945 it again became part of China, where a power struggle was taking place between the Nationalist government of Chiang Kai-shek and the Communist resistance movement of Mao-Tse-tung. At the end of 1949 Chiang Kai-shek lost the struggle and fled to Taiwan with over a million of his compatriots, drawn mostly from the upper and better-educated strata of Chinese society. In Taiwan he established the national government, which he considered and which is still considered by the present régime to be the sole legitimate government of the whole of China.

The policies of the Taiwanese government and the ruling party, the Kuomintang, are based on the beliefs and philosophy of the father of the Chinese revolution of 1911, Sun Yat-sen. In evidence of his strong influence, the dogma he pronounced in 1924 of the "Three Principles of the People" - nationalism (of the people), democracy (for the people) and wellbeing (of the people) - is repeatedly called to mind on many diverse occasions. The political situation in 1950 was extremely tense. The effects of war had not passed Taiwan by, and the Kuomintang was in control. The dogma of the Three Principles nevertheless played a continuous role in the further development and maturation of the social, economic and political institutions of Taiwan, officially called the Republic of China.

One of the positive effects of Japanese rule, which had great importance to the further development of Taiwan, was that as early as the 1920s the groundwork was laid for a shift from large agricultural landholdings to cooperative popularization, and agricultural production was focused on staple crops such as rice and sugar and not, therefore, on 'colonial wares' (exotic goods such as spices). Japan, which was at the time busy industrializing, had a need for and interest in such

products. Agricultural development was also stimulated through the use of fertilizers, the construction of an infrastructure and the introduction of modern crop varieties. A sort of green revolution was occurring in Taiwan during this period, and the first steps were taken towards the development of small private farms operating within a cooperative framework. In addition, the Japanese set up a successful school system in the rural areas. When the Chinese from the mainland established themselves on Taiwan in 1950, they encountered a land which, though battered by war, nevertheless possessed a strong agrarian community. Taiwanese agriculture was not yet reformed, but the basis for reform was present. Besides rice and sugar, bataat (sweet potato) had also become a staple crop, in addition to tea, bamboo, vegetables and fruit. The annual growth of agricultural production from 1923 to 1937 had averaged almost 4%.

From 1950 the government of Chiang Kai-shek further advanced the development of Taiwan's agriculture and in this effort received invaluable support from the USA in the form of a sort of mini-Marshall Plan. This support was firmly tied to a foresightful US demand for agricultural reform. A special US-Chinese commission, with a substantial budget, had far-reaching authority in the implementation of reforms. The foundation was thus laid for an agricultural community composed of small independent private businesses. In 1969, seventeen years after the introduction of the reform, 80% of the farms were owned by the farmers who worked them, in contrast to 36% in 1952 when the reforms started to take effect. Improved productivity resulted in an average increase in agricultural production between 1953 and 1968 of over 5% per year. Land prices decreased as a result of the reform and farmers' incomes increased to such an extent that they could spend over 20% of their incomes on small-scale industrial activities, focused especially on modern agricultural methods. In this way, industrialization began on a small scale in the rural areas. There was no exodus to the cities, and no breakdown of the social structure. This process of development should be contrasted with that of the People's Republic of China, characterized by the collectivization of agriculture (following the model of the USSR) and a premature concentration on large-scale industry in the big cities. At the same time, the Taiwanese government had been conducting a policy of import substitution which in conjunction with the promotion of free enterprise production quickly produced results. In 1962 this was followed by a policy aimed at stimulating exports, based upon a relatively low wage scale and a market for consumer products which was first developed domestically. Gradually, with foreign know-how and often also participation, local industry began to focus on exports (Philips Taiwan established itself there in 1962 and now has sales of about US\$500 million). Throughout this time Taiwan has had virtually no inflation, no unemployment and no poverty. The distribution of wealth in Taiwan, as measured by the relative positions of the richest and poorest classes of society, is among the most equitable in the world,

including the West.³ Industrial development is still proceeding strongly in 1988 and since 1980 has been concentrated in the service sector and advanced technology. To give an example, the Taiwanese shipping firm Evergreen, set up in 1969, is now the largest container shipping company in the world, with sales of just over a billion dollars and a net profit of 10% of sales. The government anticipates an average annual increase in the gross national product to the year 2000 of 6.5%, a continuation of the trend of the past 10 years. Per capita income is expected to rise to a level at which Taiwan will be able to call itself a developed country. It already possesses foreign currency reserves of over \$60 billion and is commonly referred to as the economic miracle of the Far East.

Setting up the project

From 1979, I regularly visited Taiwan in connection with negotiations over a contract for two modern submarines for the protection of the shipping lanes to and from the island in the event of imminent war. On my visits I was able to observe and experience Taiwan's furious rate of growth. The contract was to be linked to a number of large civilian orders with respect to which the energy sector was particularly important to my enterprise. It became clear to me that the increase in energy consumption required, for example, an additional electric power capacity of 1500 megawatts (MW) per year. The Netherlands, by comparison, would need such additional capacity only every six years, disregarding replacement. When I looked around me at the traffic congestion and the polluted air, the clearly visible and serious pollution in the rivers in and around the capital Taipei, and the unrestricted and careless dumping of household refuse, I began to ask myself: what is the price of this miracle?

The submarine contract was signed in 1981. From the middle of 1983, I again travelled regularly to Taiwan, this time on a private basis, to immerse myself further in the economy-ecology dilemma. In the beginning of 1984, I conceived the plan of setting up a study group to consider this dilemma, since Taiwan suggested itself to me as a dynamic mini-model for investigating one of the most difficult challenges facing human society — how to combine economic growth and ecological balance.

Taiwan is an island without immediate neighbours. It has a rather autocratic but nevertheless modern political leadership, which has thus far shown itself to have great managerial ability, and sizeable financial resources. It should be in a position to avoid repeating the Western experience of environmental pollution, with its tremendous long-term costs and consequences. Although time is short for Taiwan it is nevertheless still at a stage of development where the damage can perhaps be contained. From the point of view of international prestige, which Taiwan greatly needs, a course of action by which Taiwan demonstrated itself to be not only an economic miracle but also an ecological miracle would be a tremendous coup.

In 1984 I set up the non-profit Trans-Form Foundation to administrate the project. It was not until the beginning of 1985 that enough material was collected in Taiwan, Europe and the USA to produce a well-documented proposal for the structure of a Taiwan 2000 study. Initial commitments were secured for the financing of the project from the Asia Foundation, and from the Taiwanese government and industry (in this case Philips Taiwan and KLM Royal Dutch Airlines); later the Rockefeller Brothers Fund supported the study as well. The institutional base and the responsibility for the project were established at National Taiwan University in cooperation with the Academia Sinica. The project was carried out under the direction of a steering committee of five professors with an average age of under 40, representing five different disciplines (economy, geography, sociology, zoology and environmental engineering).⁴ Trans-Form's role from then on was to locate the foreign experts necessary to the project and to complete the financing arrangements.

The project began in October 1985. On July 28, 1987, the draft report was presented at an international symposium in Taipei. The main speaker was Dr K. T. Li, the Minister without Portfolio and *éminence grise* of the government of the Republic and generally considered to be the architect of the economic miracle.

Outcomes of the draft report

The most important aspect of the draft report released in 1987 is, in my opinion, the critical picture it paints of the present health of Taiwan, viewed in terms of quality of life, of nature, of the environment, public opinion, government actions and future economic plans. The study reveals, for instance, that the past 35 years of successful economic growth have had the following effects:

- With a few exceptions, all of the country's rivers are polluted to such an extent that fish life is becoming extinct.
- Over 95% of sanitation facilities are not connected to a sewage system, and Taiwan has the highest percentage of hepatitis cases in the world.
- Household refuse, which has increased in the last 10 years from 0.5 kg to 0.75 kg per person per day, is transported to open dumping sites. Soon there will be no space available for such dumping and insufficient preparations are being made for an alternative means of disposing of such refuse.
- No control is exercised over industrial and agricultural pollution of air, water and soil, and regulations are imposed only incidentally and in a limited fashion.
- Between 1977 and 1985, the number of motor vehicles on the island increased from 1 million to 7 million and the concentration shifted from motorcycles to cars.
- The level of harmful gases produced by motor vehicle traffic in the big cities during rush hour is in some areas well above the OECD standard.

- The increasing number of roads has overwhelmed nature to such an extent that almost everywhere on the island the number of animal species and their population is steadily declining.
- Neither the short- nor the long-term economic policies of the government provide for a parallel ecological plan.
- The projected economic growth to the year 2000 of 6.5% per year, with a population increase of 1.1% per year, entails a doubling of demands on the environment between now and the year 2000.
- The environmental policies are reactive and not anticipatory.
- Public opinion is demonstrating an increasing degree of dissatisfaction with the quality of the environment, and protest actions against projects which harm the environment are becoming more common.

With respect to population growth, the situation appears to be coming under control. The present goal is further to reduce population growth to 1%. It has already decreased from 3.3% in 1963 to 1.7% at the beginning of the 1980s. This is necessary because with 20 million people living on the approximately 10000km² of the island which are inhabitable, Taiwan has the highest population density in the world. In addition to the modest population growth which is nevertheless occurring (with a projected population of 22 million by the year 2000), it is increased productivity which is responsible for the continuation of exponential growth.

Commentary

As examples, Figures 1 and 2 (see last page of this article) show the increase in the number of motor vehicles and in energy consumption and correlated electricity usage. Scenarios relating to energy, electricity and transport were prepared with the help of econometric sector models from the Interdepartmental Study Group for Energy and Environmental Science of the University of Groningen by Drs. B. de Vries as part of his participation in and contribution to the Taiwan 2000 project. The alternative scenarios presented in these contributions indicate the effect of the policy changes required to achieve a balance between economic growth and ecological preservation. According to de Vries, policy changes in the energy sector would have to consist of specific and narrowly defined measures for energy conservation, co-production of heat and electricity in industry, and a shift from heavy to light industry. It is currently planned by Taiwan Power that between now and the year 2000 an increased power capacity per year of 1000 MW, recently adjusted downwards from 1500 MW, will be installed in the form of large nuclear and coal-burning power plants. In view of the financial burden of over \$1.2 billion and the ecological pressures on water and air, which the installation of such new capacity will create, it seems impossible to imagine that this could be accomplished without irreparable damage.

De Vries's policy recommendations for the transport sector include immediate implementation of the strictest possible emission control standards for motor vehicles and accelerated investment in public transportation. There is simply no room for the number of motor vehicles to continue increasing at the present rate, and such an increase would pose a serious threat to public health.

In general, there will probably always be natural feedback mechanisms with a corrective effect—such as human reactions and behaviour changes—which come into play. The delayed response of natural reactions to exponential growth is such, however, that if preventive measures are not taken now, there is a danger that Taiwanese society's capacity to support such growth will be exceeded to such an extent that it will take a long time and the loss of many lives before a new equilibrium can be established. That is what scenarios must make clear to policy makers and if possible to the public. With respect to both the transport situation and energy supply, but also in other sectors, the fact remains that over the long term, a finite island cannot be infinitely burdened. In the course of the next century Taiwan will face a situation in which quantitative economic growth must be brought into balance with qualitative ecological growth.

In addition to making use of econometric models (such as the so-called CE scenario developed in The Netherlands), which focus on the shorter-term situation, the report also introduces prototypes of the system-dynamics approach of the Massachusetts Institute of Technology. Through this approach policy makers can be made aware of actions which must be taken today in order to make possible a future for Taiwan which is acceptable economically, socially and in terms of quality of life, without unnecessary catastrophes.

Recommendations

Recommendations contained in the report may be divided into two categories. The first includes a number of concrete short-term measures which the government must adopt in order to fill in the gaps and correct the shortcomings in existing environmental legislation. Reference is made to the great urgency of these measures and to experiences and measures implemented in the West.

Secondly, the report points to the necessity of a second phase of the Taiwan 2000 project. A further investigation into maximum tolerable future levels of environmental pollution and impairment of health, and a comparison of such levels with the situation today, will necessarily increase present knowledge and deepen insight. The information thus gathered, can then provide a better basis for the shaping of the environmental policies, which are necessary to bring the economy and ecology of the island into equilibrium. The government's long-term planning ignores this equilibrium altogether, and the need to take into account the ecological factor is the most important and urgent recommendation in the report. For this purpose the use of the previously mentioned scenarios based

on econometric and system-dynamics models can be extremely helpful. It would therefore be essential that the expertise and materials necessary to apply such methods be obtained within Taiwan.

The future

It is clear that a second phase of the Taiwan 2000 project is required. It seems, however, that a second phase will only be useful if the government and business community are, as part of the study, directly involved in the development and implementation of the recommendations from phase one and in making proposals for concrete measures of a practical nature. Such measures must not be limited to laws, institutions and policing mechanisms but should emphasize individual responsibility, preventive rather than remedial action and above all nonpolluting technology. They should make evident the economic advantages of ecologically responsible conduct.

Public opinion should evolve from protest against to demonstration for. If we look only at the problem of household refuse and traffic it is clear that the individual and his or her own actions, and the individual business and its own sense of responsibility, are ultimately decisive. This sense of responsibility would, one would think, appeal to Chinese society, with its roots in the ethics of Confucius and the philosophy of Lao-tse. But there is little evidence of these roots in present-day Taiwan. Still, it would be regrettable for Taiwan to become enmeshed in a web of complex and unmanageable bureaucratic regulations, which lend themselves to delays and evasion.

It is becoming clear in Taiwan today that the public, the government and industry are showing greatly increased awareness of the need for urgent measures and initiatives to restore the neglected balance between economy and ecology. In the second half of 1987 a new government agency, the Environmental Protection Administration, was created at Executive Yuan level, headed by a young and experienced legislator, Eugene Chien. He has initiated the institutionalization of a tripartite consultation between government, industry and university and two of the members of the Taiwan 2000 steering committee are participating in these consultations. There are also plans to set up training programmes for scenario techniques that should lead to integration of ecological planning into the highly advanced economic planning system of the Taiwanese Council for Economic Planning and Development. Taiwan 2000 is a unique document in the Far East for its comprehensiveness in assessing the state of the environment of a region. When it comes out, it will provide an indispensable basis for policy making at all levels in Taiwanese society. The authors of the report deserve high praise for the professional quality of their work and the contributions they have made to the benefit of the future of Taiwan, and the example they have set to other regions in the Far East and elsewhere in the world.

Taiwan could become a model for the world in demonstrating that a balance between economy and ecology is both an absolute necessity and an achievable possibility.

Notes and references

1. 'The Taiwan 2000 report: balancing economic growth and environmental protection', to be published in September 1988 by the National Taiwan University, Department of Geography, Taipei, Taiwan 107.
2. The draft report, also published by the National Taiwan University, was issued on July 28, 1987.
3. The ratio of earnings of the richest 20% of the Taiwanese population to those of the poorest 20% of the population has dropped from 15 to 1 in 1950 to 5 to 1 in 1985.
4. The Steering Committee consisted of the following: Professor Chang-Yi Chang (Chairman), Professor P. C. Chiang, Professor Y. P. Chu, Professor H. H. Michael Hsiao, and Professor Lucia Liu. Foreign experts also made contributions. Among them were C. Barney (Washington, DC), D. Kreutzer (Cambridge, MA, USA), A. Merrick Freeman (Bowdoin, MT, USA), B. de Vries (Groningen, The Netherlands), R. Huetting (The Hague, The Netherlands), J. Robinson (Boulder, CO, USA), and R. Stone (Buffalo, NY, USA).

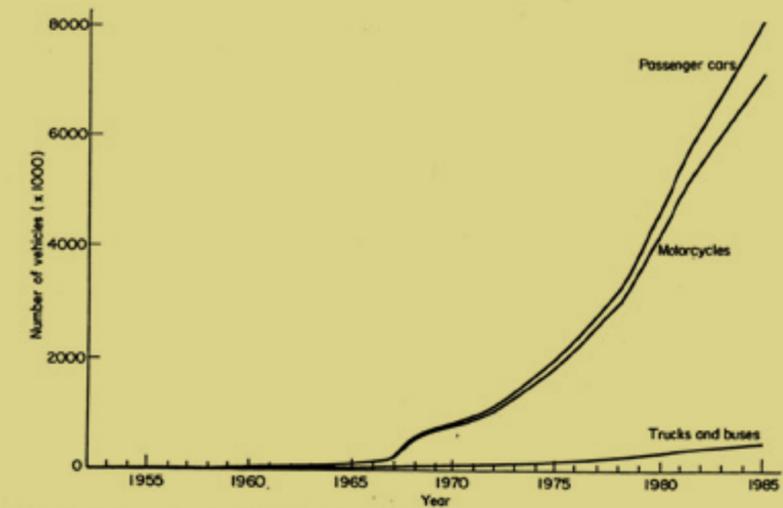


Figure 1. Number of motor vehicles in Taiwan, 1952-85
Source: CEPD Statistical Data Book

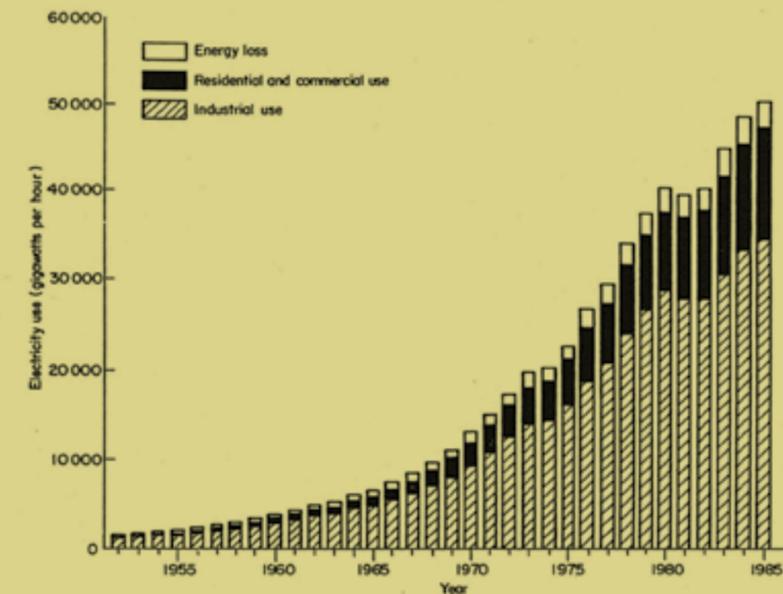


Figure 2. Energy use in Taiwan, 1952-85
Source: CEPD Statistical Data Book