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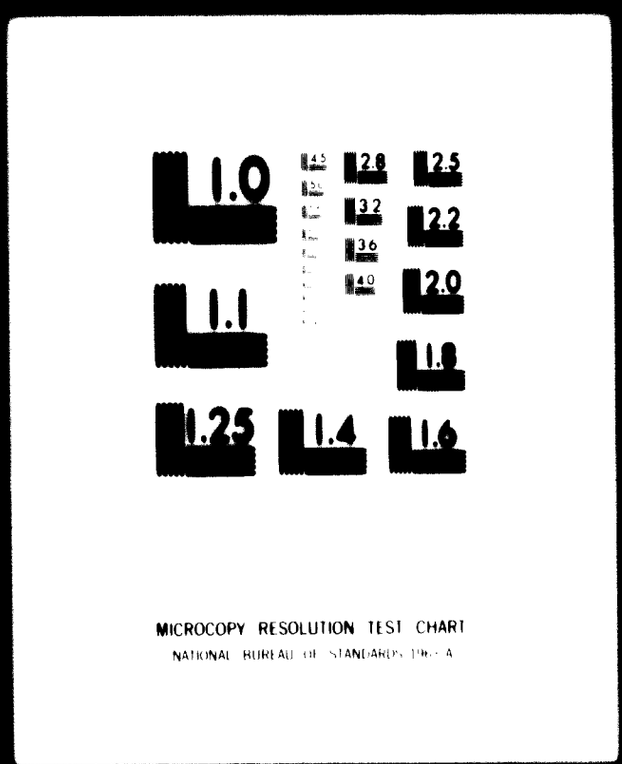

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION

(R) DRAFT REPORT.

# ELECTRONIC INDUSTRY
# OF
# REPUBLIC OF CHINA.

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SS-SMC 049

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**Summary**

This study was commissioned to determine the engineering needs of the electronic industry in Taiwan and to recommend technical activities for an institution in Taiwan which would be of direct use to the industry. For reasons discussed in the Report the study concerns itself only with the home industry. The expatriate industry is taken into account only in so far as it effects the home industry's operations.

The home industry was found to be in a rather elementary state. The companies are hardly more than manufacturing plants supported only by services essential for trading; rather rudimentary sales, accounts and production management. Business services namely technical support, marketing and business management virtually do not exist.

The absence of business management was found to be the main barrier preventing satisfactory growth. Enough technical talent can be found in the country to meet industry's immediate needs should the management choose to use it. Therefore, rather than to propose technical assistance on a piecemeal basis the Report recommends to tackle the management problem first. It recommends to set up an agency, a management trust, which would supply business management know-how as a service. When the companies were helped to organise themselves in a businesslike manner they should be able to diagnose their own technical weaknesses and to deal with them within their own resources. Technical aid in narrow specialists fields may then be appropriate.

With respect to the industry's destiny the Report recommends that the industry should concentrate all its effort to meet the needs of the expatriate companies for components and services. This market is seen to have a character of permanency within a span of any practical long range forecast. It is also expected that the market will maintain its exceptional growth for several years ahead. The market will be big and demanding enough to stretch the industry's capacity and [illegible] capability to its practical limits. In the role of a service industry to the expatriate market the home industry will be able to take fullest advantage of its main asset, its labour force and to minimise the effects of its main weakness, the business management. The Report also proposes a programme of research conceived with the service role of the industry in mind.

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## 1. INTRODUCTION

There is only one thing wrong with the Government investment policy as far as the electronic industry is concerned; the expatriate operations of the foreign investors are frequently regarded as being a part of the national electronic industry in Taiwan. Such view is misleading for a number of reasons. It distortes the true state of the home Chinese industry.

With a few exceptions the expatriate operations in Taiwan form a part of world operations of international companies who for reasons of commercial convenience established assembly plants in the country. Their interest in the host country does not go beyond the benefits they derive from the facilities offered to them and for which they pay. The lifelines of most expatriate operations form a part of a network of international operations of corporate parent bodies. If the international operation collapsed the particular expatriate operation in Taiwan would close. If on the other hand the national economy of the host country collapsed, the expatriate operations would hardly be affected.

If the expatriate manufacture of electronic equipment in Taiwan cannot be regarded as being a part of the national electronic industry, how should it be regarded then? The answer is of course that it is a business and banking operation of a special kind mounted by the Government of the Republic of China to sell factory facilities and to attract substantial hard currency deposits. The nature of the

products manufactured under this arrangement is immaterial and of no direct consequence to any one of the Taiwan industries.

There are, however, two aspects of the expatriate operations which do affect the Taiwanese electronic industry. First of all it creates a new large market for electronic components and for assembly services in the country. The second aspect is the fact that through employment of local labour the expatriates bring into the country practical on-the-job training in up-to-date techniques and methods superior to those used by the native industry. Therefore the expatriate operations bring to Taiwan new business opportunities, they educate and they set new standards of industrial performance. They do not become, however, a part of the national industry. They remain its customer.

The terms of reference of the present UNIDO mission call for an appraisal of the Chinese electronic industry in Taiwan in order to determine where assistance could prove most beneficial. For reasons discussed above this Report will deal with the home industry only. The expatriate industry will be considered only in so far as its operations have any relevance to the performance of the home industry.

## 2. HOME INDUSTRY

For quick reference performance figures of the home electronic industry in Taiwan were tabulated in Table A.1, Appendix A. The Table gives also comparable figures for the expatriate industry and for the component and electronic consumer industry of Great Britain.

2.1. Size

In 1969 the Chinese electronic industry in Taiwan produced estimated US$ 30 million worth of goods inclusive of some 10% of intercompany sales. This is equivalent to US$ 210.000 per 100.000 of population which compares with US$ 1.7 million in Great Britain and US$ 5.5 millions in the USA. The Chinese output, however, represents 0.6% of the GNP as compared with 1.2% contribution of the component and consumer electronics in Britain. Therefore, in respect to the size of the national economy the home industry in Taiwan is reasonably important.

2.2. Growth

Exceptionally high growth rates are frequently quoted for the electronic industry in Taiwan. These figures are due exclusively to the growth of the expatriate operations. Taking the home industry alone the average growth over the past 10 years appears to be around 8% p.a. which is substantially below the average 13.2% for GNP taken over the same period. This would indicate that the industry has not benefited from the recent influx of capital in the country.

Electronic industries in Britain and in the USA grew annually in recent years by 10% and 14% respectively.

2.3. Products

The products of the home industry can be broadly divided into three categories, namely telephone equipment, radio components and

consumer electronic apparatus.

As one would expect manufacture of telephone equipment has longer tradition in Taiwan than the rest. Full range of equipment for automatic telephone switching systems ranging from public and private exchanges to subscriber sets is produced in the country. The 1969 output was probably in the region of US$ 8 - 10 million. The equipment is of Japanese design. The quality and appearance are good though in performance the products do not quite meet world standards. The equipment is adequate for the requirements of the Telecommunications Adminstration. Partly owned b Japanese to the tune of 49% the telephone industry has little chance and less ambition to compete with the Japanese. Recently it lost a major home contract to them.

It is estimated that some US$ 6 million worth of radio components were made in Taiwan in 1969. Of this quantity about 2/3 were passive components and 1/3 active. Only the simpler kind of components such as fixed rather than variable resistors/inductors is made, however. The production is almost invariably oriented towards the low quality and of the range the components being largely used only in simple products such as cheap transistor radios and similar goods. Active components consist mainly of receiver tubes though some semiconductor devices are also assembled in the country. Under the guidance of their expatriate customers few manufacturers are starting to make quality products in their factories.

The home industry produced somewhere between US$ 14 and 16 million of consumer electronic equipment in 1969. This included finished products for the home market as well as sub-assemblies for export. Among the finished products television sets and portable transistor radios were prominent. Radiograms and better quality broadcast receivers were also made. All better quality products were made to Japanese designs, mostly on the basis of Japanese minority holding in the Taiwanese company. The cheap products were just copies of non-proprietary sets available on the world markets. The more go-ahead companies are beginning to design their own new products, however.

2.4. Companies

Characteristic feature of the home industry is its fragmentation. Of the 118 Chinese companies registered with the Electrical Appliance Manufacturing Association over 50% employ under 50 people. Their integrated output amounts to only between 10% and 15% of the total national output. These small companies are hardly more than traders. At the other end of the scale some 40% of the national output is produced by only 5% of companies employing more than 500 people each. The most promising companies were found in the 100 - 500 employees category. Some 30% of companies belong to this category. They are responsible for some 30% of the national output.

## 2.5. Production

The visited plants producing finished products gave an impression of efficiency. The working conditions were found somewhat depressing in some cases by Western standards. Control of quality was found somewhat arbitrary in some assembly plants and mostly inferior in the visited plants manufacturing components. The main criticism is made of inferior test equipment where the lowest cost seems to override considerations of quality and reliability of products. Test equipment standards and facilities for test equipment maintenance were conspicuous by their absence in some cases.

Production facilities and practices in few of themost recently founded companies were found beyond reproach. Their operations look promising. Nor can serious critism be made of the quality of production practices in the telephone equipment plants. The Japanese participation in the telephone companies may have something to do with it.

## 2.6. Labour

Because of its cheapness labour is often used uneconomically. Frequently it is used in place of capital investment. Consequently the overall labour productivity figures are low inspite of the diligence, high discipline and high working moral. At the national average of US$ 2.500 per employee per year (half or less in some component plants) it is only 2/3 of productivity achieved by the expatriates and 1/4 of the British figure. (See Table A1 making

allowance for the difference in the ratio of direct to indirect labour in Taiwan and in Great Britain).

Intelligence, patience, perseverance and dexterity of the local labour was frequently praised during the interviews in expatriate companies. In the opinion of several contacts Taiwanese female labour is the only labour in the world capable of performing operations for which full automation, involving large sums of money, would be necessary elsewhere.

## 2.7. Technical Know-How

The know-how in the industry is confined almost 100% to production engineering and even here it is mostly limited to the assembly process. Any design engineering was until recently virtually non-existent, the nearest activity being engineering of circuit changes made necessary by occasional change of component suppliers. The situation is about to change, however, as already mentioned. One of the very promising component companies is even setting up a team of applications engineers to advise their customers on the use of semiconductor devices.

## 2.8. Business Performance

On the basis of rather rough calculations the profits of the home electronic companies should be around 20% on sales - a high margin indeed. Low overheads and exceptionally high sales to capital ratio seem to be the main contributing factors.

Low overheads are due to virtually total absence of R + D recoveries and to very low S + A (sales and administration) costs. To illustrate, it should be noted that in Taiwan home companies indirect labour accounts for only some 12% of the total labour employed (see Table A1) while in the British industry direct and indirect labour are practically equal.

The sales to capital ratio was found to vary between 2:1 and 4:1 in analysed companies. In comparison the British figures are between 1.6:1 and 2.8:1. Explanation of the difference is in the low value of the capital employed in Taiwan made possible by uneconomical use of labour rather than by efficient organisation.

Wasteful use of labour is also apparent from the high wage bills taken as a percentage of ex-works prices; 5% to 8% in Taiwan against 8% to 10% in Britain. With labour more than 10 times cheaper than in Britain the closeness of the percentages betrays overstaffing.

The main critism of the industry's business performance is the lack of marketing capability. The industry lacks initiative to approach potential customers (customers themselves have to find the vendors), displays no enterprise to a just its operations to the needs of the new market and lacks boldness in facing risks.

## 3. PROBLEM AREAS

### 3.1. Management

The main weakness of most of the Chinese companies is lack of modern management. The managements seem not to have out-grown yet a traderman's approach to life. Commercial operations requiring organisational skills and long term commitments of plant and capital are avoided. Marketing is frequently down to almost selling over the counter to a customer who calls. Dynamic selling does not exist. Opportunities are allowed to go by. Little use has been made so far of the expatriate market created on their doorstep.

Yet the expatriate market is the key to making the home industry to play its role in the development of the Taiwan national economy.

It is certain that without radical change in management outlook the industry will not perform better with respect to the expatriate market in the near future than it has performed in the recent past. Meanwhile the opportunity may be slipping away. The expatriates will fill the void themselves if thehome industry does not step in. Eventually some expatriate operations may even move into another host country capable to offer better support from the local industry.

In order to bring about the necessary change in the available time an expedient will be proposed in Section 5. It will be proposed to set up an agency, a management trust which by acting as a catalyst between individual home manufacturers and the expatriate market would provide

the management skills and the marketing drive needed by the home manufacturers in order to operate as an efficient industry.

## 3.2. Management Training

Hand in hand with absence of management skills goes the lack of opportunities for practical management training. Most companies are too small to have a decernable management structure. The big ones appear overcentralised giving no opportunities to young promising men to develop their capabilities to take decisions and to gain management self confidence. The chief executives exercise decision making powers even on matters of minor importance.

More liberal attitude of companies towards's attendance of seminars, courses, exhibitions etc. by their employees in company's time and at company's expenses would offset the lack of practical opportunities to some extent.

In view of the generally low standards of business management practices in Taiwan it is suggested that the question becomes a matter of concern for the Government. Measures taken by some European Governments in the course of the last decade to create a favourable climate for improvement of the quality of business management could profitably be studied by the Taiwanese authorities.

## 3.3. Qualified Manpower

Lack of qualified people in production and sales and their virtual absence in design engineering is equally serious. Compared with a fully developed consumer electronic industry such as the one in

Britain, the Taiwan industry in its present state, that is as a production facility without R & D, is short of some 700 graduates. Fully developed R & D would require another 200 qualified engineers. The sales function is equally understaffed - some 900 qualified people are missing. See for comparable figures Table A1, Appendix A.

To become viable the Taiwan industry does of course need not to equal the ratio of graduates needed by the world industries. However, the number of graduates must be increased.

The attitude of the home industry towards employment of high caliber labour must change. The annual output of Taiwan Universities of some 50 electronic engineers may be on the low side in the long run. It is adequate, however, for the current needs.

While the industry should be capable to offer attractive possibilities to the young engineers leaving colleges, its immediate need is for experienced men with management potentialities or preferably with management experience. This kind of people can be found among the Chinese engineers working in the US. Some of these men would be glad to return home if challenging jobs were offered to them. Perhaps the Government could help here by setting up a kind of 'Get You Home' service on the model of services operated by some European countries who suffered from the brain drain.

There is yet another source of experienced manpower so far little used; the expatriate companies in Taiwan. Quite few people working

in the expatriate companies would change for a challenging job in a chinese company. It is up to the home industry to offer scope - and pay. Unfortunately the Chinese companies still seem reluctant to pay the market price for high caliber key personnel.

3.4. Problem of Japan

The dependance of the home industry on Japan is excessive both, technically and commercially. Vast majority of the products made by the home industry were designed by Japanese firms and Japanese components, parts and raw materials are being imported up to the tune of some 50% or even 60% of the final value of the product in some cases.

While the use of Japanese designs seems quite a reasonable thing to do, the commercial strings attached to technical agreements are positively unhealthy. The home industry seems to be in a commercial bondage to the Japanese. The home companies seem unable or uninterested and perhaps both to retain their commercial freedom as a part of an agreement with a Japanese partner.

A programme of emancipation is proposed in Section 5. Should the proposal be found impractical or should it fail then the present bondage to the Japanese industry may be the next best thing. At least it is a bondage to a dynamic and uniquely organised operator from whom much can be learned.

## 4. CONCEPT OF SERVICE INDUSTRY

### 4.1 Philosophy

It would be unrealistic to try to build the Taiwan electronic home industry into a power capable of competing with the international giants in the world markets. Taiwan does not possess a home market big enough to support an industry of a size needed for financing research and marketing organisations big enough to survive world competition. The time is short and the type of manpower needed for such an operation is not readily available. However, conditions in the world markets have created a situation which offers an opportunity of a different kind.

Because of the fast mounting production costs in their home countries the world giants were faced some while ago with a choice of either investing heavily at home to automate the production there or moving their manufacturing facilities abroad into areas of low production cost. They chose to go abroad because of the technical and economic problems of automation technology. The decision to internationalise the manufacturing facilities created a demand for a new kind of services in certain parts of the world. Taiwan happens to be one of them.

The initial demand for services was very ably met by the Government of the Republic of China through facilities offered in the Export Zones, through bonded operations etc. Having become established the expatriate operations are now looking for additional services; local supplies of components and local assembly plants interested in sub-contracts. This demand offers the Taiwanese home industry a unique opportunity to grow up as a service

industry making the fullest use of its main asset, the labour and minimising the importance of its main weakness, the lack of business drive.

The danger of being dependent for most of the business on relatively few world corporations is not as great as it may seem at first. Having invested into an internationalisation of their operations the large corporations are committed to this mode of operation for at least the next 10 years on economic grounds alone. In fact having found a satisfactory solution to the production problem the world corporations are unlikely to change their course as long as the services offered to them in the host countries are economic and meet their standards of quality. It will therefore be up to the host countries and their national electronic industries to ensure continuity of this kind of business by offering adequate services as an alternative to full automation of production in highly industrialised countries. It is a technically challenging role and could be very profitable too.

The argument that the industry should be able to hold its own in the face of world competition because of the low cost of its labour should be deprecated. The present cheapness of production is more due to the absence of overheads than to the cheap labour. Once R + D and S + A had to be paid in full the picture would radically change.

In a sense the concept of service role to the world industry should not be new to the Japanese industry. It is in fact how it is being used by the Japanese at present. The difference would be that committing itself to this role as a result of deliberate policy the industry would understand its

role and would control its own destiny by selling its services. In the present situation it is providing the service in a passive way taking what comes rather than choosing what is most advantageous.

## 4.2 Proposal

In view of the philosophy discussed in the previous sub-section it is proposed that the electronic home industry in Taiwan develops its technical and commercial capabilities in three special areas discussed below in order of their importance and expected profitability.

(i) Manufacture of high quality components for expatriate companies and for export.

(ii) Sub-contracting of assembly operations from expatriate companies and for export.

(iii) Manufacture of medium quality consumer equipment for home market and for export.

## 4.3 Component Manufacture

It is estimated that the expatriate industries consumed between US$ 60 and 70 million worth of components and materials in 1969. Allowing say one half for materials, the market for finished components should have been around US$ 30 million. Its growth is directly related to the growth of the expatriate operations in the country which was averaging some 70% in the past years. So far all but some 10% of the components are being imported because the home industry either cannot meet the quality or it is not trying to sell.

The size and the dynamism of this market speak for themselves. Further not inconsiderable advantage is the keen interest of the expatriates to buy in Taiwan. Nor should it be overlooked that if the home component industry succeeded to improve the quality of its products so as to satisfy the needs of the expatriates, it will have a fair chance, given an effective marketing organisation, to succeed in the world markets in its own right. The present worth of the world markets is some US$ 6,000 million.

4.4 Assembly Operations

The market for this type of service is thought to be smaller at present than the component market. It may be the faster growing one of the two, however. The qualities and the low cost of its female labour put the Taiwanese home industry in a very competitive position in this field.

Some risk to this kind of activity can be seen in the ultimate emergence of MSI/LSI technology which could in the future virtually elliminating the assembly operation as understood today. The risk however looks somewhat real only in the digital field affecting in Taiwan only assembly operations of desk calculators and similar devices within the next say 5 years. It is unlikely to affect the consumer electronics in this decade, if ever. And even then MSI/LSI chips still have to be accessible to the user through keyboards, knobs etc; vidio or audio output has to be provided; and the machine has to be mounted in some sort of housing. Change of electronic technology would mean therefore shift from an assembly of discrete components towards an assembly of components with mechanical orientation. The business would not need to collapse; not even to shrink in volume.

## 4.5. Research

If the production services are going to be the main commodity which the home industry is going to offer its production techniques and practices must be of high quality. To achieve the quality and to maintain itself ahead of competition the industry will need a supply of know-how through effective research in practical matters concerning production. Four research projects are recommended below as being complementary to the recommended three areas of industry's activities.

Co-ordination of the proposed research and industry's needs should be achieved through the Agency proposed in Section 5.

(i) Manufacturing Techniques.

The team carrying out this research should in first instance make itself knowledgeable in all modern techniques of manufacture of electrical components made or proposed to be made in Taiwan. Subsequently it should either adopt these techniques to the pecularities of the local conditions or develop new techniques where appropriate. The team should also undertake similar work in the area of assembly of equipment using discrete components and integrated circuits. This is an urgent task.

(ii) Effect of MSI/LSI Technology on Assembly Techniques.

This work should be an extention of research described in the previous paragraph. The purpose would be to evaluate the effect which the advanced integrated technology is likely to have

the assembly activities of the home industry and to initiate measures needed to be taken in good time so that the viability of the assembly service could be preserved.

(iii) Design of High Quality Discrete Components.

The task of the team engaged on this project would be to re-design where appropriate discrete components selected for improvement by the Agency proposed in Section 5. The re-design would be oriented towards improvements of the quality and towards the ease and precision of manufacture. The work would take full account of the work of the team engaged on Project (1). This is an urgent task.

(iv) Test Techniques and Test Equipment

This team would concern itself with development of techniques for production testing, chiefly of components. Emphasis would be on automation of testing of precision components manufactured and on ways of production organisation which would enable several manufacturers to share expensive test equipment. The team would design such test equipment as necessary. This task is of medium urgency.

4.7 Joint Ventures

Taiwan is only one of the countries in South East Asia patronised by the world corporations in search of expatriate facilities. While a foreign client is looking for facilities the national Governments compete with each other for his patronage. Once he settles in a particular country, however, the local national service industry is in an obvious advantage

vis-a-vis competitors from abroad. Competition between nations stops at this point. National service industries from now on have a common interest to serve their respective expatriate markets. On this basis a case for co-operation and joint ventures could be made.

Joint Ventures would serve several purposes:-

(a) By agreement to manufacture only certain components in each country sufficiently large production volumes could be secured to obtain high economy of production.

(b) Operation would be big enough to support a world marketing organisation.

(c) Joint research facilities could be set up.

(d) Japanese hegemony could be counteracted on adequate scale.

Aluminium foil for electrolytic condensers and metal stampings for transformer cores are only two of many products which could quickly start this kind of activity.

## 5. ELECTRONIC INDUSTRY MANAGEMENT TRUST

### 5.1 Concept

Details of the method of operations of the Trust will be found in the Draft Constitution in Appendix B. The concept of the Trust is to provide business management service to the home electronic industry in Taiwan who through the lack of business initiative are depriving the national economy of reaping full benefits of the expatriate operations in the country. To achieve the purpose the Trust would operate in the first instance as a marketing organisation bringing together qualified Chinese suppliers of

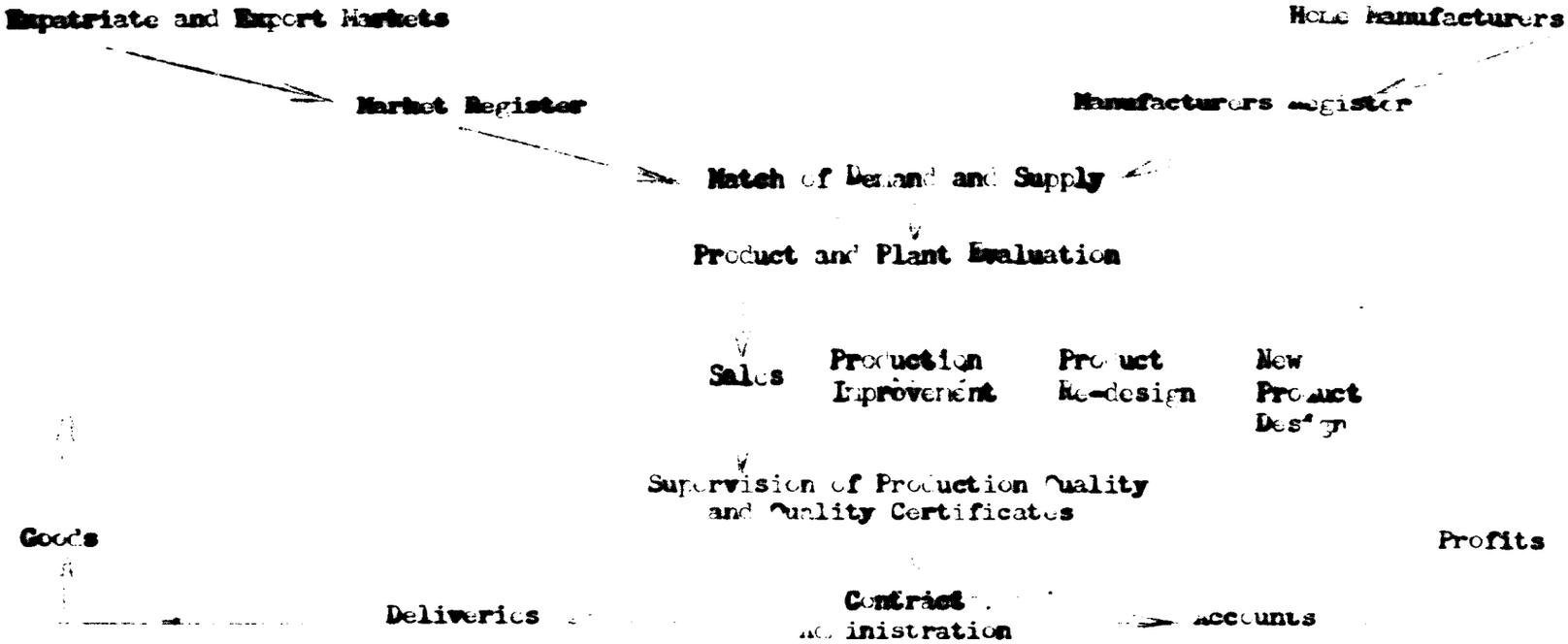


FIG. 5.1. : Electronic Industry Management Trust; Diagram of Operations

services and expatriate customers requiring these services. In the second instance the Trust would advise the Chinese companies how to improve quality of their products and services to meet the demanded standards. The Trust would also advise the Government on matters of fiscal and economic policy towards both the home and the expatriate electronic industries in Taiwan.

The Trust would not be a permanent agency. Its constitution would be periodically reviewed and should be changed according to the progress of its work. The Trust would cease to exist when it was felt that the home industry reached maturity.

The Trust should earn an income from its operations to support itself. It should be non-profit making otherwise.

5.2 Method of Operation

The main purpose of the Trust would be to provide education in business practices and since most effective method of education is by way of an example the Trust would operate as a trading company. It would be headed by an experienced businessman. The operations to be performed by the Trust are schematically shown in Fig. 5.1.

The basis of the Trust's operations would be the Market Register which in the first instance would hold the requirements for components and services of only the expatriate companies in Taiwan but in time would be extended to cover export markets as well. Cooperation of the expatriate companies would be obtained to keep the Register up to date. As a next operation

the local Chinese manufacturers would be approached or persuaded to offer products and services against the registered requirements. The offered products would be tested for quality and the manufacturers plant inspected for reliability of supplies. If both were found satisfactory the Trust would enter into a contract with the customer to supply the goods. At the same time the Trust would place an order with the manufacturer.

If during the initial inspection either the product or the plant were found deffisient the Trust would advise the manufacturer of necessary improvements to his plant, his production methods or his test practices. The Trust could also advise to re-design the product. In all cases concerning improvements the Trust would act in an advisory capacity by providing the know-how either from its own resources or in co-operation with qualified outside bodies and commissioned experts. After improvements were effected the Trust would proceed with the sales of the improved goods.

Success of Trust's operations would depend on its reputation as a guarantor of quality. To maintain this reputation the Trust would have to exercise effective supervision of the quality of goods in the manufacturers' plants prior to delivery to customers.

The technical operations described above would have to be supported by administrative facilities for handling of contracts, keeping of accounts and for day-to-day office routines.

5.3 Complementary Organisations

When setting up the Trust proper account would be taken of activities of all existing organizations, agencies etc. with functions complementary to the Trust's purpose. The Trust would be so constituted as to make use of these facilities rather than to duplicate them. The following facilities should be considered in this connection:-

(i) Union Industrial Research Institute could provide through its electronic laboratory facilities for evaluation of components before and after Trust's intervention. Its facilities could also be used for development of test methods, test equipment and test practices in the companies under Trust's tuition. The Trust would pay for the services. The Trust must be free however to set its own facilities should UIRI services be found inadequate.

(ii) China Productivity Center could be made use of in design of production improvements needed in the defficient plants and in evaluation of plant capacity and reliability. Same remarks concerning the purchase of services by the Trust apply here as in the case UIRI above.

(iii) Central Trust of China should be helpful in compilation of the Export Market Register and in arrangements connected with export contracts.

(iv) Commercial R & D Institute sponsoring of which is being considered by the Chung-Hwa Electronics Development Company could be commissioned by the Trust whenever design services were needed by its clients.

## 5.4 Financial Considerations

In order to obtain an accurate estimate of the initial and running costs of the Trust a feasibility study would have to be carried out. However, some very rough estimates to indicate the order of costs were made.

The initial capital requirements are estimated to be in the region of US$ 250.000. This money should buy the basic test facilities, accomodation and staff to start the operation. Thereafter the annual overheads are estimated at between US$ 50.000 and 60.000. Total running costs cannot be foreseen without the feasibility study. The costs should, together with the overheads be recovered from the charges for services. Provision of initial capital remains an open question. The easiest way out is to suggest that the Government or an international agency should supply it. Perhaps other sources can be thought of in due course.

## 5.5 Reactions to the Idea

The idea of the Trust and its purpose was favourably received by all large expatriate companies with whom it was discussed. It was considered a good idea by the larger Chinese companies too and by most of the medium sized ones. Few smaller companies could not see much use in it. For one thing they were companies with strong Japanese ties.

# 6. CONSUMER EQUIPMENT AND BEYOND

Case was made in the previous sections for the home industry to stake its future on the expatriate market at home as its service industry. The opportunities in the consumer equipment market must not be overlooked, however.

The producers of the consumer equipment may be the more successful section of the home industry at present but in the long run their chances seem less promising than the prospects of the service companies. With an easily saturated home market they will be increasingly dependant on their export performance. It seems that this will be more and more difficult to maintain in the future. Their markets in the low income countries of the Middle East, Africa and Latin America will come increasingly under pressure from the state-aided industries of the socialist countries in Eastern Europe and eventually from the world corporations themselves. It is an open question how many of the Taiwan home companies will then be able to maintain their positions and perhaps even to survive. In comparison the service companies should be able to lead a relatively assured existance.

Some exceptional companies capable to survive in a truely competitive international environment may already exist in Taiwan, however. They are probably among those few young and bright companies met in the course of this study who are currently trying to break away from the Japanese dependence and are striving to make their own way with products of their own design.

The near future will test their technical and marketing capabilities and those who survive should be able go beyond the consumer products. Desk calculators and test equipment are favourable subjects for speculation. There are many other directions to choose from. For example electronic toys and low power communications systems could lead in combination to

small control systems to be used in various appliances and eventually in motor vehicles. This in turn could open the way to diagnostic testing and medical electronic. Another potentially promising avenue are teaching aids which should lead to educational systems. Other combinations should be possible to derive.

Any speculations of this sort are sterile and can be even dangerous unless they are backed by solid knowledge of the market possibilities, own marketing capability and technological research all fitting into a well conceived long range plan.

7. ROLE OF THE GOVERNMENT

All large electronic companies in the world owe their success to a greater or smaller degree to the financing, by their respective Governments, of some of their research activities. Through placing well defined development contracts with the industry the Governments not only can aid the national electronic industry but it also can direct it in some specific technological or commercial direction. No evidence of this practice was found in Taiwan.

It is suggested that if in the future the Government wishes its home industry to play a more effective role in the economic development of the country this neglect will have to be rectified. Sub-section 4.5 and Section 5 list technology areas from which research projects suitable for Government financing could be selected. To be effective this financing must be done through placing precisely defined development contracts in the industry open to bids of all companies. It was found

in other countries that this is the only sure way how to develop the necessary know-how directly in the industrial environment where it can be effectively converted into commercial products. Awarding research grants to institutions is a legitimate way to stimulate research with academic orientation. It can be justified only when research at the industrial level is well established.

Development contracts not only create technological know-how in the industry. They also educate the managements of the companies handling the contracts through forcing upon them to plan of long term business operations.

Any guidance by the Government must be exercised within a well defined national policy based on long range market and technological forecasts and on overall interests of the national economy. Such policy must of course be defined first.

## 8. CONCLUSIONS

(i) There are two electronic industries in Taiwan; the home industry and the expatriate industry. Only the former has a significance as a Taiwanese electronic industry. The latter is an important customer.

(ii) The Government has been successful in selling its services as a landlord. The home industry has so far largely ignored the opportunity to sell its services as a sub-contractor.

(iii) The trend towards internationalisation of manufacturing operations by world corporations is expected to grow for at least the next 10 years and probably longer. Therefore, the market for services seems assured for quite a few years ahead.

(iv) Since the home market is too small to allow the home industry to develop on a world scale it should concentrate on the opportunity created by the growing demand for services by the expatriate market in Taiwan.

(v) In the role of a service industry the home industry can best exploit its main strength, the unique abilities of the Taiwanese labour, while minimising demands on the business capabilities of its management, its main weakness.

(vi) To compensate for the weakness of the management talent and to act as a catalyst in creation of an efficient electronic service industry. Electronic Industry Management Trust should be set up.

(vii) An efficient electronic service industry in the country will give an advantage to the Government in attracting further expatriate companies in the face of competition from other countries in South East Asia.

(viii) Companies successful in the electronic consumer equipment market should be encouraged to venture into new technological areas and new markets through Government development and research contracts specifically formulated for their guidance.

(ix) The Government should define a long range policy for the home electronic industry on the basis of market and technological

forecasts and then guide the industry within this policy by awarding development and research contracts to individual companies on the basis of commercial bidding.

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| | |
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| Yeh, J., | Chief of Sales, Taiwan Capacitor Ltd. |
| Yu, L.C., | President, Chung Hwa Electronic Development Co. Ltd. |

SOURCES OF INFORMATION

1. Training and Research Centre for Telecommunications and Electronics, Republic of China, UNDP/ITU, Geneve 1968.

2. Electrical and Electronic Household Appliances Industry in Taiwan (R.O.C.H.) Dr. R.R. Bonin, UNIDO Marketing Expert, 1968.

3. Taiwan, SRI International Investment Studies, Dec. 1969.

4. Highlights of the Fifth Four-Year Economic Development Plan of the Republic of China, March 1969.

5. Taiwan Statistical Data Book, 1970.

6. The Asia Electronics Conference, Nov. 1969.
Country Reports on Taiwan and Japan.

7. Guide Book to Electronic Industries in Taiwan, Nov. 1969.

8. Annual Statistical Survey of the Electronics Industry, Electronics EDC, London, July 1970.

9. EIA Electronic Market Data Book 1970.

10. National Chiao Tung University Bulletin 1968-1969.

11. National Cheng Chi University Bulletin 1969-1970.

12. Focus on Taiwan, Economic Study of the Republic of China, Bank of America, National Trust and Saring Asso., Jan. 1968.

13. Modern Management Development in Taiwan by S.C. Kao, Feb. 1969, China Productivity Center.

14. Confusian Teaching and Modern Management, by B.E. Boeton, June 1970, China Productivity Centre.

15. The Makers of Taiwan, by W.G. Goddard, China Publishing Company 1963.

Table A1 : Performance of Electronic Industries in 1969.

| | | | Taiwan | | United Kingdom (Consumer Goods and Components only) |
|---|---|---|---|---|---|
| | | | Chinese | Foreign | |
| Total Sales | | (US $ million) | 30 | 120 | 1,000 |
| Invested Capital | | (US $ million) | 10 | 50 | 600 |
| Labour Force | Total | (Persons) | 12,000 | 35,000 | 200,000 |
| | Direct | (Persons) | 10,500 | 32,000 | 90,000 |
| | Indirect | (Persons) | 1,500 | 3,000 | 110,000 |
| Productivity | Per All Employees | (US$) | 2,500 | 3,500 | 5,000 |
| | Per Direct Employees | (US$) | 2,750 | 3,800 | 11,000 |
| Persons in R and D | | (% of Total) | neg. | neg. | neg. |
| Persons in Sales | | (% of Total) | 2.5% | neg. | 10% |
| Total of Graduates in Industry | | (% of Total) | 0.5% | 1.0% | 8% |

ANNEX A

Table A 2 : Distribution of Chiao Tung University Graduates (September 1970)

| | Total | | B. Sc. | | M. Sc. | | Ph. D. | |
|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % |
| Working in USA | 158 | 27 | 49 | 13 | 109 | 52 | | |
| Home Electronic Industry | 10 | 2 | 2 | 0.5 | 8 | 4 | | |
| Expatriate Electronic Industry | 31 | 5 | 23 | 6.5 | 18 | 9 | | |
| Armed Forces | 194 | 35 | 170 | 47 | 24 | 11 | | |
| Academic | 93 | 16 | 56 | 15 | 32 | 15 | 5 | |
| Civil Service and others | 81 | 15 | 63 | 18 | 18 | 9 | | |
| | 569 | | 363 | | 209 | | 5 | |

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ANNEX A

Table A 3 : Comparison of Pay Scales in Chinese and Expatriate Companies (NT$ per month)

| | Chinese | Expatriate |
|---|---|---|
| Female Assembler | 800 - 1200 | 800 - 1000 |
| Technician | 1200 - 1800 | 2800 - 4000 |
| Junior Engineer | 2800 - | 2800 - 4000 |
| Senior Engineer | 4000 - 5000 | 4000 - 7000 |
| Chinese Manager | 5000 - 6000 | 8000 - 12000 |

APPENDIX B

Draft Constitution

Electronic Industry Management Trust

1. General

The Management Trust would be self-financing but non-profit making. Its constitution should be periodically revised.

2. Functions

(i) Provide marketing service for Chinese manufacturers of electrical and electronic components and Chinese purveyers of manufacturing and assembly services particularly with respect to the needs of expatriate companies in Taiwan.

(ii) Educate Chinese manufacturers by persuation and by practical assistance in business management concepts so as to make them better equipped to meet requirements for quality of products and for standards of business practices needed to increase trading with the expatriate companies in Taiwan.

(iii) Sell to the expatriates products and services available from the Chinese electronic home industry

(iv) Act as a national export agency of all electronic products and manufacturing services.

(v) Sponsor educational events to promote the professionalism of industrial management in the electronic home industry in Taiwan.

(vi) Advise the Government on matters of fiscal and economic policy towards both the home and the expatriate electronic industries in Taiwan.

3. Method of Operation

(i) The Trust would operate and be managed as a trading company. Direction and extend of its educational function in business management would be dictated by its business interests.

(ii) The Trust would set up and maintain a register of electrical and electronic components, of all related products and of services required by the expatriate electronic companies in Taiwan.

(iii) Similar register would be kept with respect to the world markets.

(iv) Modern techniques of information gathering, market research and data storage/retrieval would be used.

(v) The Trust would not hold stocks of goods. It would place orders with suppliers only in quantities for which it had immediate resale.

(vi) The Trust would ensure that the resold goods met the buyers' specifications. This would be achieved through regular visits of inspectors to plants handling the Trust's contracts and through tests of samples either in Trust's own laboratories or in laboratories commissioned by the Trust.

(vii) All articles resold by the Trust would carry Trust's propriatory stamp apart from the manufacturer's identification. The Trust's stamp would be a gurantee of quality.

(viii) The Trust would make suggestions to local manufacturers with respct to new products. In this it would be guided by its market research activities. The Trust would also commission new designs with R & D consultants in the appropriate cases.

(ix) Selling through the Trust would not limit in any way the manufacturers' freedom to sell directly in domestic or export markets.

(x) Where no product of suitable quality was available in the country the Trust would prevail on manufacturers to improve their products. In such cases the Trust could provide a consultancy service either from its own resources or by a commissioned consultant. The consultancy charges would be credited until such time when the fee could be repayed from the share of the distributed surplus (see Point 4(iii)) due to the manufacturer for goods sold on his behalf by the Trust.

(xi) Educational and publishing activities would be performed in conformity with established practices.

(xii) The Trust could trade under a commercial name if it wished.

4. Financing

(i) Basic capital to start the operation would be provided by the Government, an external agency or other sources.

(ii) The Trust would obtain goods from manufacturers at their normal prices and sell them to the expatriates or in export markets at maximum prices obtainable.

(iii) The profits would finance Trust's operations. Any surplus would be distributed to manufacturers in proportion of the value of their products sold by the Trust. The Trust would be entitled to retain some of the profits in accounts earmarked for long term projects designed to improve the service.

(iv) Seminars and all educational activities would be run at a profit.

(v) Publishing of journal(s) and of other educational material would be run at a profit.

5. Government Support

(i) To aid the acceptance by the industry of the 'go-between' role of the Trust, the Government might be asked to offer some inducements. Graduated scale of tax concessions on sales transacted through the Trust is a one possibility. Other possibilities could be thought of in due course.

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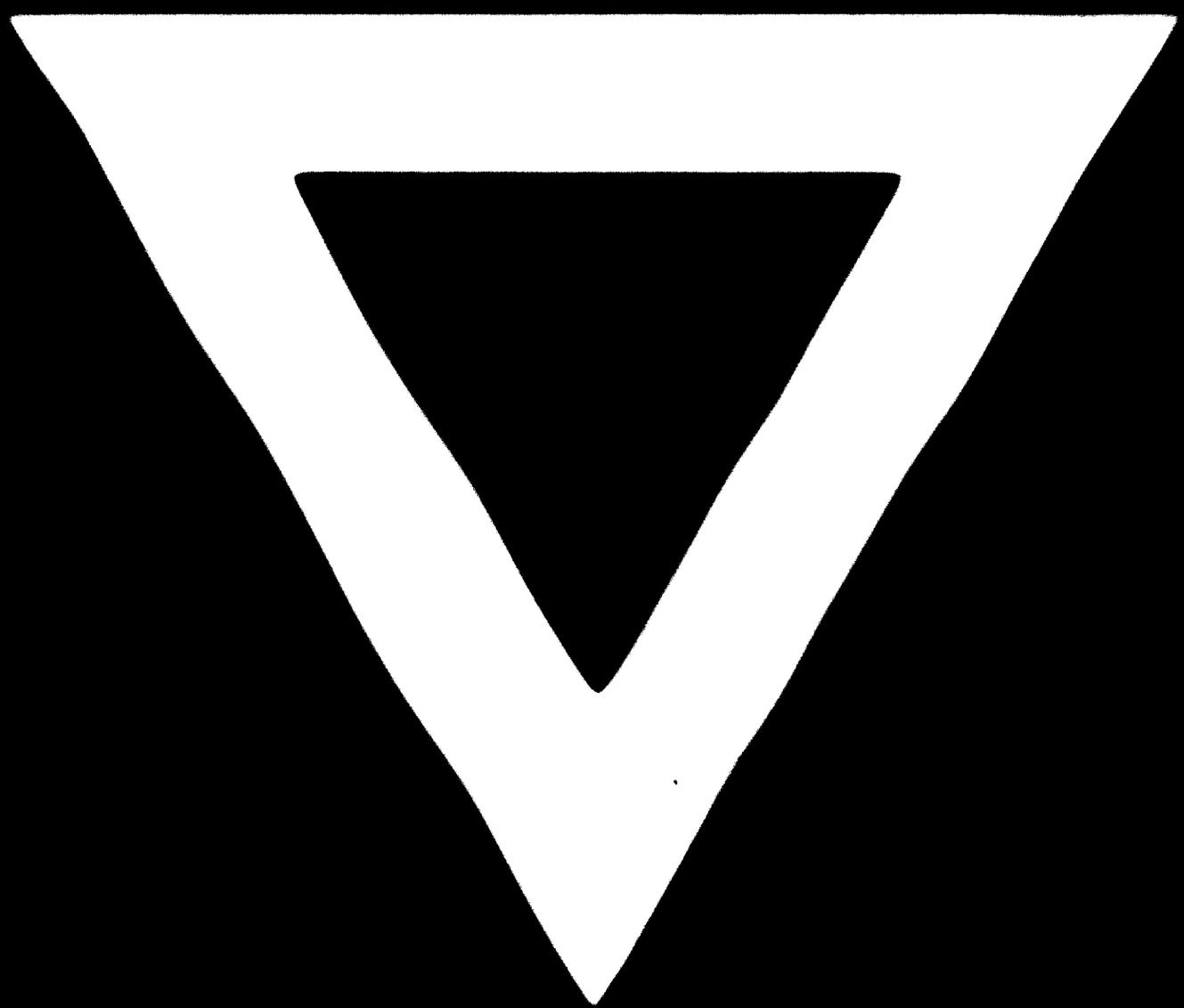

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