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Foreign Opportunities To Lower Production Costs



Electronic Show and Convention
September 11, 12, 13/Dallas, Texas

Sponsored by IEEE Regions Four and Five, Dallas and Chicago, IEEE
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Foreign Opportunities to Lower Production Costs

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Electronics Manufacturers

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1/2 An Overview of Contract Manufacturing in Asia

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Colin Henry
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Robert Carlson
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HONG KONG: AN OVERVIEW OF OPPORTUNITIES
FOR ELECTRONICS MANUFACTURERS

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Electronics is Hong Kong's fastest growing industrial sector. It is an activity particularly well suited to Hong Kong's economy and infrastructure. In 1982 the export of electronics goods exceeded U.S. \$2.5 billion and accounted for 21% of our domestic exports. Garments remain Hong Kong's major industrial sector with electronics in second place, but one leading economic survey estimates that by 1987 this situation will be reversed, with electronics then playing the leading role in our industrial scene.

In this paper, my intention is to trace the development of the electronics industry in Hong Kong from its early beginning to the present time and to point the way for the future development of this sector. Before launching into this, however, it is necessary to sketch in the background of the territories' overall policy towards industrial development.

Traditionally Hong Kong has always been seen as a staunch bastion of the virtues of capitalism and a prime example of the laissez-faire style of government. Milton Friedman in his 1980 TV series highlighted Hong Kong as the shining example of free enterprise and held it up to the world in justification of his economic theory of the power of market forces. While this is true, it is not the whole truth, for Hong Kong has had government involvement in trade and industry---not for the purpose of regulation and direction, but because it has long been recognised that assistance, not intervention, is the appropriate role for Government in development of a healthy industrial economy which will serve both the needs of the people and the vaults of the Treasury. Laissez-faire has long been out of fashion. Our present Chief Secretary, who, after the Governor, is the territories' senior official, coined the phrase "positive nonintervention"---

an expression open to a multitude of interpretations. My own definition, "assistance without intervention," sums up what I see as my role in the development of our industrial base.

In practical terms, there is always an ill-defined area between helping and interfering, and it is not an easy role to play.

When does assistance become direction disguised as guidance, and when does the valid need to measure size and output of industry become a burden on its performance? Ever conscious of this, Government walks a continuous tightrope with the natural tendency always to do too little rather than too much. We already legislate to ensure reasonable employment conditions but not wages, which are determined by market forces. Hong Kong is a signatory to GATT, the General Agreement on Tariffs and Trade, and we also benefit from several GSP schemes operated by the U.S. and other advanced industrialized nations. Our obligation under these treaties involve Government in industry to a degree which could, otherwise, be characterised as interference.

Nevertheless, despite its limitations, our industrial policy is, I believe, the correct approach for Hong Kong. Essentially it says -- you, the industrialist, are free to manufacture and market what you will, where you will, with no constraint or hinderance to legitimate commercial enterprise. We, the Government, are concerned only with providing the right surroundings for your success, compatible with the interests of the environment and the community. We treat all industries on an equal footing and there is no discrimination against foreign investors or protection for local industries.

This policy has worked well for the textile, garment and toy industries,

and a continuous dialogue between government and industry ensures that each understands the other. There is some dissent in the electronics industry, some of whose leaders, while not advocating protection, are vigorously lobbying Government for additional support in the battle to remain competitive and to upgrade the value-added content of their labour. Some of these arguments have prevailed, particularly in respect to education and vocational training. Government also assists in research projects but stops well short of any subsidy to manufacturers.

The circumstances of electronics in the '80s are very different from those of the spinners and weavers in the 60s, particularly in the face of the aggressive industrial development policies of our Asian neighbors, and I believe it is both proper and necessary to assist this sector of our economy.

As little as twenty years ago, it was virtually impossible for any U.S. electronics company to set up its own subsidiary in Japan. That nation's post World War II administration, principally through MITI, effectively blocked any foreign investment which was not a minority joint venture. The technology input which this far-sighted policy produced has today enabled Japan to become the major threat to the U.S. in the race for technological superiority (and hence market share). Such a policy could never have worked in Hong Kong where we have to rely on a mixture of cooperation and entrepreneurial spirit to upgrade our industrial skills.

And that, in a nutshell, is the thrust of our policy of assistance -- to upgrade the industrial skills of our workforce, to increase the scope of original design and development for the benefit of the community at large. In doing so, it is my belief that Hong Kong can become of major advantage to U.S. companies in countering the Japanese threat to their domestic and world markets. It is an opportunity which should not be missed.

The birth of the electronics industry in Hong Kong can be traced to 1959 when Japan allowed the export of radio receiver components. A number of small local factories began to assemble radios using Japanese components. This was followed in the early 1960s by the establishment of U.S. investments in the manufacture of discrete components -- diodes, transistors and capacitors. Core memories followed shortly after. At that time the attraction was low cost labour but there was a marked shortage of trained graduates and diploma students to fill the supervisory and management appointments. The industry was dominated by foreign investment, mainly American, both in terms of output and employment. There was a high level of expatriate management. The free enterprise approach worked well in attracting companies such as Fairchild Semiconductor, Teledyne and Ampex, but did little to encourage them to broaden their base in Hong Kong. This was largely because of the chronic shortage of local engineers and executives. Another drawback was the lack of supporting industries. I recall one U.S. company in the mid-sixties which rejected Hong Kong as a manufacturing base because they were unable to locate a service agency for a flow soldering machine.

Hong Kong engineers were relatively quick to acquire the technical skills required in manufacturing management, but commercially much slower to appreciate the need for the development of related industries. The major limitation on the growth of the transistor radio industry in the 1960s was the poor quality of the plastics industry, not the ability to design and build receiver circuits.

By the early 1970s the trend towards semiconductor memory circuits was well established and a steady decline in core memory production resulted. At the same time, labour costs in Hong Kong outpaced those of other Asian nations and the labour intensive elements of IC packaging industry started to drift away to

lower cost areas. Those foreign investors who stayed concentrated on higher reliability and greater added value chips while the "jelly beans" went to such areas as Malaysia and the Philippines.

The decade of the 70s saw the dominance of foreign subsidiaries give way to the rapid expansion of local participation in electronics manufacturing. Much of it came as a natural diversification from the wealth created in textiles and garments. The packaging of semiconductors peaked about 1976 which further emphasized the emergence of locally financed industry.

The big surge forward came about 1977 with the advent of microelectronics in consumer packages -- the "fad" product stream. The first boom came earlier in calculators and the consequent growth in output of LDCs and LEDs had a direct impact on the lightening success of the electronic clock and watch business. Hong Kong now accounts for something approaching 20% of the free world's output of digital watches although it should be noted that 60% of the foreign investment in this sector is Japanese. The subsequent growth of the TV game using LDC technology is the latest trend in the fad technology market. Throughout the whole period of this development, the industry has largely sold through private labels. No identifiable Hong Kong brand image has emerged. This is a clear and regrettable indication of the industry's inability to accumulate consumer recognition. Even in the more mature products, radio receivers, cassette recorders, car stereo units and audio centers it is difficult not to identify a Hong Kong brand name although many well-known labels are produced in Hong Kong by Hong Kong companies for the brand leaders.

A recent survey of our leading electronics companies showed that only 20% see themselves developing mature or professional products. The fad market requires little original technology but does depend on a fast reaction to fashion and product changes. Many of Hong Kong's smaller companies will continue to be sustained by this sector in the next few years.

Supporting Industries

One of the early lessons one learns in California is the high degree of integration which exists in the Silicon Valley. In technology industries, everyone is a specialist in his field and relies heavily on the services of others. Each manufacturer can, within the Valley, find competitive bids on all the services and subcontracts he needs for his product. At the present time Hong Kong cannot quite claim the same degree of linkage, but it has taken great strides towards this end over the past ten years. Hong Kong has probably the best plastics moulding industry and the most advanced tool and die making facilities in Asia outside Japan. The availability of servicing for U.S. made production test equipment is excellent. There is a good precision diecasting and light metal machining industry. On the distributive side, there are well organized supply facilities for U.S., Japanese and locally made components at prices which are frequently very competitive by U.S. standards. Some of the more esoteric facilities are still not available but where there is a need there is usually an agent.

In short, the view of the industrial infrastructure is encouraging with the major shortcoming being in the limited capacity for precision metal working parts and in the service industries, the availability of software specialists.

Technical Back-Up Services

A major study on Hong Kong's Industrial structure in 1979 recommended the establishment of back-up services and identified electronics as a primary area to be served. In consequence, Hong Kong is about to open a Government run Standards and Calibration laboratory and an enhanced facility for the testing of materials, components and products. In the past the Standards and Testing Centre had to rely on the United Kingdom for primary certification but it is hoped that Hong Kong will shortly have its own international accreditation.

Industrial Support Facilities

Broadly defined, technical back-up services aid production while support facilities promote research and development for the introduction of new products and processes.

In Hong Kong's case there is very much more development than research, and among the activities are a micro-processor applications laboratory and a CAD/CAM development program jointly sponsored by the Hong Kong Productivity Council and by a number of U.S. firms. One proposal made in a recent Productivity Council report on the electronics industry recommends the establishment of a Computer Integrated Manufacturing Institute as part of an overall policy of encouraging industrial automation. There is no doubt that such a move would be welcome by industry in general and would greatly add to the electronics infrastructure.

Graduate and Vocational Training

In considering the contribution of manpower to the process of upgrading industrial products and processes we have departed from the conventional view that education is the responsibility of the Government while training is the burden of industry. Hong Kong currently has two universities and one Polytechnic College -- a second polytechnic due to open in 1985.

In addition, Government has established an Electronics Industry Training Board run by the Vocational Training Council whose aim is to provide a flow of operatives (i.e. assemblers) and craftsmen (manufacturing repairmen). The demand for this training currently exceeds the Board's capacity. The VTC also recently introduced an Engineering Graduate Training scheme to promote the training of new electronics graduates in industry.

Approximately 20% of all Hong Kong science graduates spend a further year studying overseas, many here in the U.S. while others go to the U.K. and Canada. They represent a necessary element in the growth of the electronics industry.

The Electronics Industry Today

The second half of 1983 saw a rapid improvement in almost every sector of electronics manufacturing. This was largely in response to the recovery in the U.S., but it illustrates that 70% of our production is still consumer oriented. The truly significant growth area, however, is in components for professional products. On the latest figures available, this area shows a dramatic increase:

EXPORT VALUES (US \$ MILLION)

Computer Peripherals (complete)		
Jan-June 83	Jan-June 82	% Change
50.1	9.5	+425.8
Computer Components		
192.2	108.0	+ 77.9
Telephones/Telecoms, Equipment		
134.0	18.7	+691.8

Source: Conic Industries Review 1983

Other areas of growth in the same period were semiconductors (mainly C-MOS) 9.5%, electronic watches 33%, and color TVs at 81%.

Despite the increase in professional components, Hong Kong remains as much as ever an OEM or private label supplier. This trend will continue and procurement managers will find Hong Kong engineers more willing to sit down with them to discuss specific products than to design for the industry at large.

Among the products and components now available from a number of companies are:

- magnetic heads for video, disk and tape drives
- linear and switching power supplies
- precision plastic mouldings
- precision aluminium die castings

- dies and mold-making
- disc drive mechanisms
- modems
- microswitches
- single and multilayer PCBoards

In addition, a number of companies are offering complete subcontract assembly facilities for computer and consumer products.

The Future

The thrust for the future must be towards further integration of the industry. It is not, at the present time, sufficiently capital intensive by the standards of the U.S. or Japan, although it is probably equal to or ahead of our neighbors in this respect.

The combined effects of the industrial recession of 1980/82 and the uncertainty over the future of Hong Kong have both contributed to this.

In the coming year more companies are committed to auto-insertion machines for PC board assembly and at least two

companies have advanced plans for meeting the demands of SMD technology.

Many companies are undercapitalized and have asset/turnover ratios of 8 to 10 where typically U.S. companies would work on ratios of 2 to 1. There is no shortage of available investment funds and it is reasonable to expect the capitalisation of companies to grow in line with their output.

Greater emphasis on technology development is needed. This will best be achieved by joint venture operations with foreign companies, and we expect to see an increase in the number of joint ventures for the future.

These and other factors are the fine tuning which a healthy industry will implement almost by osmosis under the influence of free market forces.

The Hong Kong electronics industry is in good shape and is available and ready to meet the needs and the challenges of the 80s. It can, I believe, become an important ally to the U.S. industry in helping to meet the coming Japanese threat to its high tech markets.

AN OVERVIEW OF CONTRACT MANUFACTURING IN ASIA

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There is currently a strong trend towards the use of contract manufacturing by OEM companies in America. This phenomenon has been building over the last number of years. A great deal of this work is being done in the Far East. Therefore, it is appropriate to examine the fundamental reasons for selection of vendors in such areas as Japan, Korea, Taiwan, Singapore and Hong Kong.

A preliminary explanation of the primary reasons offshore contract manufacturing is used includes three main considerations:

- Lower Cost: obviously lower cost is the driving force behind the decision to use offshore contract manufacturing
- Reduced Capital Investment: contract manufacturing allows the OEM to establish or increase plant size with little invested capital
- Rapid Increases in Capacity: most contractors have basic capacity in plant as well as equipment and people ready to put to work for new OEM customers

After a company has determined it is beneficial to go offshore for contract manufacturing, key factors must be evaluated to select the country and the specific contractor. Before any commitments are made, it is a good idea to study the political and economic stability of the country. An uninterrupted relationship with the contractor is essential, and this is possible only when political and economic stability exists in the host country.

Another factor to consider is the development of the economic infrastruc-

ture. The presence and condition of the transportation and communication networks as well as the education system and suppliers to support the contractor should all be examined.

The level of technology in the host country must be sufficient to support the products to be manufactured. Three levels of technical capability emerge in the Far East:

Japan

Singapore, Hong Kong, Taiwan and Korea; and

The Philippines, Malaysia, Indonesia, India, Sri Lanka, etc.

Another factor to evaluate concerns the unit cost of assembly. This criteria is a combination of labor cost, labor productivity and the level of mechanization/automation that comprise the total labor value added in the product cost.

The availability of raw material and its cost must also be considered. There is a tremendous advantage if the raw materials required for the product are available in the country of manufacture.

It is not possible to generalise about each of these key factors in respect to each country, but several of them rank high in their overall candidacy for offshore contract manufacturing sites.

American companies investigating the Asian contract manufacturing scene for the first time will find a high educational level in the general work force and electronic engineers that are well educated and experienced.

The work ethic is also thriving. People expect to work hard and contribute to their company's objectives. High productivity and low turnover and absentees all contribute to higher quality and lower costs.

The level of the electronics industry may be another surprise. This industry is highly developed in the leading countries of Asia where the following products are representative of the available manufacturing and engineering activities:

Computers -- home, personal and portable

Computer Terminals

Cable TV Converters

Home Satellite Receivers

Time Programmable Controls for Energy Management

Video Games

Telephones -- corded and cordless

System Subassemblies -- power supplies, keyboards and monitors

Audio and TV Equipment

Passive and Active Electronic Components

Let us now turn to the concept of engineering and support. American companies will find that Asian subcontractors offer variety as well as flexibility in their capabilities. Their range of abilities include manufacturing process engineering, quality assurance, manufacturing cost reduction, design-based cost reduction and finally, the design of new products to customer specifications.

Another question that must be answered concerns quality assurance and quality control which are both well established in the important industrial

countries of the Far East.

Quality systems routinely involve vendor sourcing and qualification, vendor approval, first article inspection, incoming inspection of raw materials, roving or in-process inspection and final product inspection.

Due to the need for additional transportation time, contract manufacturing in Asia requires a significant amount of advanced planning. Some contract companies require a six-month fixed commitment, and others use variations of a rolling monthly schedule that allows for changes in the schedule with notification of two to three months.

In addition to cost savings on labor, the Asian contract manufacturer is in a unique position to save his American customer even more by procuring materials and components either in the host country or elsewhere in Asia.

This can be viewed as a major advantage since costs are anywhere from 10% to 30% lower in Asia depending on the commodity. With material costs comprising a very considerable part of the product, this edge makes the completed product far more competitive.

The fact of the matter is that most mechanical, plastic and electronic components are available in Asia. In addition, the requirements for one customer can be combined with others thus giving each customer the economic advantage of large volume procurement.

Tooling for mechanical parts is also available from many sources in Asia which can provide state of the art equipment and know-how for fabrication of metal and plastic tools. And of course, the added factor here is that tools cost approximately 30% less than in the U.S.A.

How does one go about finding a suitable contract manufacturer? The amount of sales and applications

engineering that Asian contractors provide in the U.S. varies significantly. Some contractors provide no sales and technical support in the U.S. while others have sales representatives to handle their accounts. A few have established a system of sales offices in our country that provide close support to the customer in sales service and specialized technical support.

After the contract manufacturer and the host country have been examined, the final questions concern the method of payment and protection (for the customer).

The scope of payment terms is varied, but the letter of credit is the most common since these letters are quite flexible and allow the OEM to evaluate the offshore contractor. Will the overseas contractor guarantee not to sell like products to the OEM's competitors, or use his knowledge of the customer's technology to enter the U.S. market as a competitor? These and like issues must be studied with scrupulous care. What is the

contractor's track record? Check every last rumor..... and don't create competition by a careless oversight.

In summary, Asia provides an enormous opportunity for American companies to achieve substantial cost reductions and capacity increases for a low capital investment. Offshore contract manufacturers have high technology equipment in place, skilled engineers, and a productive work force. In today's economy and need to compete, U.S. manufacturers can turn offshore for quick expansion, new product production or cost reduction while leaving logistics problems to the subcontractor. In many cases there is a willingness on the part of the contractor to enter into mutually beneficial joint ventures with design or marketing organizations.

Offshore contract manufacturing and the advantages it offers deserves serious study and consideration by companies wanting to reduce their production costs.

JAMAICA: A NEW OPPORTUNITY FOR THE ELECTRONICS INDUSTRY

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Introduction

Jamaica offers as much potential to become the workshop of the Americas as Singapore has become the workshop of Southeast Asia.

Those of you who are familiar with the geography of Jamaica know that Jamaica is situated as strategically, with respect to the Americas, as Singapore is to the Far East. The similarity in strategic position of the two countries is not only geographic but extends beyond geography into the economic and business arena.

Both countries are independent island-nations with English-speaking populations fairly close in size, Jamaica having 2.3 million, while Singapore has approximately 3 million. Jamaica is considerably larger in area, with over 4,400 square miles to Singapore's 224. Like Singapore, Jamaica is a former British colony and has inherited a strong tradition of political stability and a sound educational system.

Jamaica's strategic location, one and one-half hours flying time from Miami, offers enormous advantages to the electronics manufacturer looking to source some of his components offshore. Being within easy reach of the United States, operations in Jamaica, whether they consist of a plant fully-owned by the U.S. manufacturer, a joint-venture with a Jamaican electronics manufacturer, or merely a contractual arrangement with a Jamaican assembler, lend themselves to very close supervision and quality control from the United States. Production problems can be dealt with easily. A quality control manager can have breakfast in the United States, hop down to Jamaica before lunch to diagnose and deal with a problem which may have arisen, and be back in the United States for dinner.

Infrastructure

Jamaica's highly-developed international communications system offers instant

communication, via satellite, with the United States. In addition to telex and direct-dial telephone service, documents can be transmitted instantaneously between here and there. The country enjoys one of the developing world's most extensive road systems and is well served by shipping lines and airlines.

Because of its proximity to the United States, companies working with Jamaica enjoy a considerable shipping cost advantage over companies working with the Far East. In the case of ocean freight, for example, whereas a 2,000 pound cargo between the United States and Hong Kong costs approximately \$215, the same cargo to Jamaica costs approximately \$120, resulting in a \$95 savings. This advantage translates into a significant bottom line difference, considering that raw materials and component parts for assembly in offshore operations are supplied from the United States.

The Jamaican government welcomes foreign activity in the development of the electronics industry. Thus, a tremendous range of incentives is offered to the U.S. manufacturer. These include a freezone, located next to the port of Kingston, in which the manufacturer operates without being subject to import duties, income, profits, or dividend tax, or foreign exchange regulations. The Freezone provides units in modules of 6,000 sq. ft., at an annual rental of \$3.50 per sq. ft. Leases are for a minimum of 2 years and may extend to meet each individual manufacturer's particular requirements.

Trade Advantages

Apart from incentives provided by the Jamaican government, the U.S. manufacturer engaging in offshore operations in Jamaica will benefit from Jamaica's status as a beneficiary of the Caribbean Basin Initiative ("CBI"). This means that products manufactured in Jamaica will enter the United States free of import duty. In the case of sub-

contracting arrangements, provided 35 percent of the value added to the product is of Jamaican origin, the product still qualifies for duty-free entry back to the United States. In computing this 35 percent, 15 percent of the value added in the United States may be taken into account.

Jamaica also offers preferential access to the enormous European Common Market. Under the so-called Lome Agreement, to which Jamaica is a signatory, electronic items produced in Jamaica enjoy, in many cases, duty-free access to the European Common Market, and, in other cases, reduced rates of duty. Finally, as a member of the Caribbean Common Market ("CARICOM"), Jamaican manufactured products enjoy duty-free access to the markets of the other English-speaking Caribbean countries.

Offshore Options

There are several options available to the U.S. electronics concern investigating offshore possibilities in a location such as Jamaica. The simplest relationship is a contractual relationship in which the U.S. manufacturer contracts with offshore assemblers for the manual assembly of particular items which lend themselves to labor-intensive type production. In such a relationship, the U.S. manufacturer's investment is at a minimum, consisting only of raw materials provided to the offshore assembler, and related freight charges.

Of course, the manufacturer will exercise quality control supervision and may provide technical and/or other assistance to the sub-assembler. This is an area which should prove very attractive to U.S. firms, particularly those engaged in the manufacturing of electric motors, printed circuit boards, and similar items. Jamaica has more than a dozen electronic firms that are either already doing this type of sub-assembly work or have the capacity to and are eager to enter the field.

A second option open to the U.S. manufacturer is to establish his own plant in Jamaica, more than likely in the Freezone, to manufacture items both for re-shipment to the United States as well as to take advantage of the access Jamaica enjoys to other markets such as the European Common Market and CARICOM. Jamaica imposes no restrictions on foreign business ownership, and there is no requirement that a particular percentage of a business be locally-owned.

U.S. personnel locating in Jamaica as a result of a U.S. manufacturer's establishing a plant there, will find a living environment very similar to that available in the United States. Schools and social amenities are readily available and are comparable to those available in the United States. And, of course, Jamaica's reputation as a tourist destination is so well known that there is no need to elaborate on the quality of leisure-time activity to be enjoyed there.

The third option available is to enter into a joint venture with a Jamaican manufacturer. The local partner in such a venture could provide factory space and labor. The U.S. partner might provide equipment, training, raw materials and markets. Again, such a relationship could comprise either equity participation by both the U.S. and the Jamaican partner or a contractual relationship between them.

An interesting example of a possible joint-venture relationship between a U.S. manufacturer and a Jamaican entity is provided by the "Shelter Company" concept being developed there. The Jamaican Shelter Company will provide a complete factory, within the Freezone, and will also provide a general manager, a labor force, utilities and all other basics required for the running of a factory. The U.S. manufacturer, in essence, "rents" the factory, providing only the special