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CHANGES IN THE INTERNATIONAL PATTERN OF PRODUCTION AND TRADE IN CONSUMER ELECTRONICS

Contents

1.0 INTRODUCTION

There appears to be increasing understanding that it is the interaction of business strategy with public policy which determines the scope, pace and pattern of the internationalization of production. Raw materials production, where influential farm lobbies and processing trade groups hold sway, and industrial sectors such as shipbuilding and automobile manufacture all exhibit, in their own way, the results of this complicated, industry-specific chemistry. The outcome, at any given time, is neither purely the result of factor endowments, as trade purists would predict, nor of oligpolistic influence, as game theorists would content; instead, it is a series of compromises which are difficult to forecast or model, and sometimes difficult even to explain ex post (1). Few industries exhibit this pastiche of economic forces and policy more clearly than consumer electronics - the subject of this paper (2).

Three characteristics of the industry seem to have been decisive in shaping the policy/industry interaction. The first one is the prominence of large often transnational corporations, (TNCs), necessitated by the sizeable research and development (R & D) expenditure and the returns to scale in production.

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(1) W.R. Cline called this latter phenomenon 'arbitrary comparative advantage'. "Increasingly, trade in manufactures among industrial countries, even including the newly industrialized countries (NICs), appears to reflect an exchange of goods in which one nation could be just as likely as another, ex ante, to develop comparative advantage, and the actual outcome is in a meaningful sense arbitrary. For a range of manufactured goods, it may be argued that 'comparative advantage is made, not given'" (.38 in "'Reciprocity': A New Approach to World Trade Policy?", Institute for International Economies, Washington D.C., September 1982).

(2) Consumer electronics is defined here to include familiar items like television and radio receivers, phonographs, stereo and sound equipment, tape recorders, electronic calculators, several major components such as picture tubes and new products like video-tape recorders, video-discs.
'Components' here are defined as SITC (rev.2) 776.1, 776.2, 776.3, 776.4 and 776.8; 'consumer goods' as 761.1, 761.2, 762.1, 762.2, 762.8, 763.1, 763.8.

The second is that since production involves three distinct stages, for which labour, capital and research requirements differ significantly, it is logical to save costs through internationalization. The first stage, the conception of new products and processes, requires substantial outlays on engineering skills and R & D. The second stage, production of the components, is usually capital-intensive and usually requires large production runs in order to be viable. The third stage, the testing and assembly of the parts into finished goods, used to be highly labour-intensive but in recent years has tended to become less so. Automated testing and assembly have gained popularity in the higher wage locations and quality standards demanded in the marketplace have grown, making human involvement less and less desirable.

The third feature of industry which seems to have allowed the internationalization process to take its course relatively unhindered is the fact that, unlike others such as iron and steel, most governments did not initially attach national goals or prestige to this consumer oriented industry, leaving it more in the domain of the private sector. There have, however, been increasingly frequent anti-dumping and injury investigations (22 by the US International Trade Commission over 1970 to 1984, for instance), impositions of VERs and other trade policy measures taken against goods produced in whole or in part outside the main consumer markets.

The rest of this paper will examine the forces which have been at work to shape the industry in recent years, beginning with corporate strategy and continuing on to national trade policy. Before that, however, some basic trends are assessed.

2.0 MAJOR TRENDS AT WORK

This section briefly reviews the major trends which have been at work in the industry over recent years.

2.1 Production

World output of consumer electronics has grown extremely rapidly, as shown in Table 1. World output of television receivers (TVs), for instance, has risen from 29.5 million units in 1965 to 77.7 million units in 1981. (Output then fell slightly, to 69.69 million units in 1982.) In particular countries, growth has been even more explosive. Production of colour TVs in Taiwan, for instance, grew from 0.91 million units in 1977 to 2.06 million units a year later (1). In South Korea output of colour TVs rose from 97,000 units in 1977 to 2.40 million units by 1981 (2).

Production of consumer electronics goods is concentrated in the US, European Community, Japan and developing Asia, with some goods also being produced in sizeable volumes in the CPEs of Europe. The share of world output accounted for by US production has been falling in all categories.

2.2 Trade

Trade volumes have grown almost as quickly as output from certain countries. Exports accounted for 95.5 per cent of colour TV output in Korea in 1977, for instance, although the exported proportion fell to 53 - 57 per cent over 1979 - 1982. Developing Asian countries exhibit the strongest growth of exports in all the product categories for which data is available; for instance, their share of world radio receiver exports has grown from 10 per cent in 1970 to 30 per cent in 1982 (see Table 2).

The US has witnessed a substantial increase in imports of many products. In newer products, like video cassette recorders, imports,

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(1) USITC, 1984, p.A-32.

(2) ibid.(1) p.A-30.

which have accounted for virtually all sales, have risen from 138,000 units in 1974 to 9.38 million units in 1984 (1).

The strains to which this rapid growth in imports in the main consuming countries has given rise are the subject of the rest of this paper.

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(1) EIA, 1985, p.47.

3.0 BUSINESS STRATEGIES

Having looked at the basic trends at work in the industry, this section addresses the question of the business strategies which lay behind the rapid evolution of the industry. Eight are discussed here, although it should be understood that they are not necessarily exclusive; they have in practice been combined and indeed are most likely to be observed in various permutations and combinations in each firm across time.

3.1 The Experience Curve

In the late 1960 and early 1970s a number of influential management consultants began to observe, in their case work for clients in the electronics industry, that unit costs could be forced down by an alert management through a combination of learning and experience effects. In many activities, such as TV production, diminished input of components, labour time, and better factory layout could cut up to 30 per cent out of unit costs with each doubling of production. This 'experience curve' effect, as it came to be known, became a widespread analytical and policy tool in the industry, and adherents to it began looking for more and more ways to exploit the production increase/unit cost decrease/ market share gain nexus which would allow bold competitors to drive others out of the marketplace. Another consequence of successfully exploiting the possibilities of the curve was to enjoy a higher margin under a 'price umbrella' as lower-volume competitors struggled to match high-volume competitors on cost. Offshore processing is one form of search for experience gains, insofar as it cuts labour input costs, while moving upmarket can, at least temporarily and for parts of the industry, provide some relief from a lower-cost competitor making the older product-mix. Exhibit 1 shows two experience curves found in electronics production.

Apart from having a profound influence on the speed and severity of the 'snakeout' which has occurred among competitors in each product line,

the experience curve has helped to force down the real price to consumers of most electronic consumer goods, thus further boosting demand. Exhibit 2 shows how sound equipment and TV prices fell significantly, compared to the US consumer price index, after the 1953-1984 period.

3.2 Offshore processing

Beginning around 1965, firms began to undertake a feverish search for low-wage locations for the later stages of production (1). World demand exceeded supply capabilities and many firms (mainly Japanese) undertook aggressive export programmes. Foreign penetration of the US market led to a pattern of fierce price competition that eventually became a worldwide hallmark of the consumer electronics industry. Japanese firms began moving assembly operations to South Korea and, later, to Singapore and Taiwan in order to reduce the wage component in their production costs. US firms countered in several ways but, most often, resorted to the same tactic by moving many of their assembly operations to Mexico and South-East Asia. Eventually, offshore processing became a common strategy throughout the industry as price competition spread to other products and markets.

The growing aggressiveness of price competition is not sufficient, however, to explain the strategy's popularity among producers of consumer electronics; other industries facing similar conditions have not necessarily turned to offshore processing. In fact, it is the ability to separate physically the production stages, coupled with the nature of the technological developments described above, that makes the strategy a viable one. By the late 1970s, only 30 per cent of all production sitings in the electronics field (including industrial goods and components) were

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(1) D. Keesing, "World trade and output of manufactures: structural trends and developing countries' exports", Staff Working Paper, No.316 (Washington D.C., World Bank, 1979), p.54.

not determined by strategic, technical or marketing considerations (1). Thus, major producers enjoy considerable leeway in locating their facilities. Almost all American and Japanese firms operate offshore facilities for mass production as well as sites for assembly and testing. In the US TV industry, for instance, a number of manufacturers left the industry over the 1976-1983 period, whereas others entered. In 1970 there were 17 firms assembling colour TVs in the US, this number fell to 13 in 1976 but by 1983 stood again at 17. Of these 17, five are US-owned firms, 8 are Japanese-owned, 2 Taiwan-owned, 1 Korean-owned and 1 Dutch-owned.

The development of much of the electronics industry in Asia reflects the highly concentrated pattern of buying. A survey of Korean electronics firms carried out in 1976 by the World Bank found, for instance, that 2 of the 4 major firms interviewed sold all their output to an overseas parent firm or to big overseas retail chains. This helped explain the existence of plants much bigger than necessary to exploit the optimal economies of scale in their industry (Rhee et al, 1984, pp.60-64).

In contrast, European firms were slower to adopt an offshore strategy. Phillips, the largest European electronics firm, had over 400 factories in 60 countries in 1984. However, many of its overseas activities represent the acquisition of existing operations in Japan and North America; these were not relocation decision designed to reduce labour costs but were motivated more by other objectives. One reason for this approach was that, owing to the comparatively extensive restrictions imposed on imports, price competition has been less intense in Europe than elsewhere. Somewhat belatedly, European firms began to emulate their American and Japanese counterparts in seeking to gain cost advantages through offshore sitings. By 1979, the number of consumer electronics firms in Asian LDCs that were affiliates of major companies was twice the

(1) OECD, Facing the Future: Mastering the Probable and Managing the Unpredictable (Paris, 1979) p.344.

combined total of European and American firms producing in their home market (1).

Although the search for cheap labour markets continues, rising wages and employment levels have reduced the attractiveness of traditional offshore sites like Taiwan. Thus, several firms, European and Japanese, have turned to China. Video recorder kits are now assembled there under license from Grundig which also has a collaborative agreement to produce colour television sets in the country. Sony has recently announced a similar agreement and other firms are reportedly seeking such tieups.

At the same time as US producers were uncoupling their vertically integrated operations in the US and despatching some parts overseas, Japanese firms were more and more compelled to build plants in the US to protect their sales against the trade barriers being erected in defence of the jobs which remained in US manufacture and assembly. This phenomenon of rising barriers is discussed next, then the strategies which have been adopted in response.

3.3 Protectionism

Given the extensive degree of import penetration in the US and Western Europe, it is somewhat surprising that protectionist campaigns have not been more elaborate. Rather than opting for a broad, industry-wide system of protection, however, most firms have pressed for trade restrictions on specific products. Nevertheless, the characteristics of trade restrictions in major importing markets differ in certain important details. In Europe, the unique transmission and reception technologies (SECAM and PAL) provided an effective, if deteriorating, buffer against foreign producers of television sets (2). Various other forms of non-

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(1) IDE, 1980, p.58.

(2) Licences for the PAL system will expire in the 1980s but were first used in the 1960s to restrict manufacture to European firms.

tariff barriers (NTBs) were also employed. Some were bilateral - for example a privately negotiated VER between the UK and Japan dating back to 1973 - while other restrictions were imposed unilaterally by France and Italy. The EEC also introduced restrictions on behalf of certain countries, mainly with the intention of reducing Japanese imports entering via member countries (1).

By the 1980s more ingenious forms of NTBs had emerged. One of the mt publicized was the French regulation that imports of video recorders be cleared through the small town of Poitiers. As European opposition to imports mounted, a complex trade agreement was negotiated with Japanese suppliers of both finished and knockdown sets in 1984. European firms are first allocated a minimum production level. Then, based on a forecast for each year, Japanese suppliers are allocated the difference between expected sales and European output. Furthermore, Japanese suppliers pledge not to undercut the prices of European-produced video recorders. Contrary to agreements in other industries, the number of units to be sold by the Japanese is not predetermined. As the European market has matured, forecasts proved to be overly optimistic and Japanese exports have been cut. This trend, coupled with the fact that from 1985 Korean firms were no longer restrained from exporting recorders built with Japanese technology, may bring about a fundamental change in the entire arrangement.

The protectionist campaigns by American firms have generally been in response to changing market fortunes. During periods of buoyant demand, imports soared, but rapid growth of domestic firms' sales offset declining market share. By the late 1960s, however, Japanese successes in American markets had led to frequent charges of dumping and a number of lawsuits.

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(1) G. Shepherd, "The Japanese Challenge to Western Europe's New Crises Industries", The World Economy, Vol.4, No.4 (December, 1981), p.383.

When demand slumped again in the 1970s, American firms began to press more vigorously for protection. They filed anti-dumping suits and pushed for legislation that culminated in an orderly marketing agreement (OMA) with Japanese producers of television sets for the period 1977-80. This was followed by OMAs imposed on exports from Taiwanese and South Korean suppliers. These agreements lasted from February 1979 to June 1982, limiting Korean and Taiwanese exports to 575,000 units and 485,000 units in the last year. Immediately after, their exports soared again, and the two countries became the two biggest sources of imported colour TVs.

Dumping charges were again filed in early 1984 and duties of up to 50 per cent were imposed on major Korean suppliers.

Unlike the situation in Europe, the protectionist stance of US firms was complicated by the fact that many operate a far-flung network of offshore production sites themselves. These firms, therefore, naturally favour free trade in the finished and semi-processed items exported by their subsidiaries, associates and affiliates in LDCs. Zenith, the only major producer which had no offshore facilities, took a leading role in the American protectionist campaign (1). It supported the union-sponsored move to repeal the offshore assembly provision of the US Tariff Act of 1930 and endorsed the efforts of a lobbying group called the Committee to Preserve Colour Television.

3.4 Export-replacing investment

Although the actual enforcement of trade restraints has been limited to a few specific products, they have probably provided a significant deterrent by intimidating exporters who fear restraint in future. In this sense, the tactics have had a subtle effect on the investment decisions of

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(1) The products involved in trade disputes during the 1970s included resistors, transformers, capacitors, tuners, monochrome and colour television sets, tubes, microwave ovens and citizen band radios. However, conclusive findings of trade violations were mainly confined to television receivers.

certain firms. As a result, Asian suppliers of consumer electronics have gradually begun to move their operations into the major consumer markets. Such investments and acquisitions in Europe or the US have not, therefore, been undertaken in order to reduce costs; instead, exporters have attempted to defuse protectionist sentiments by moving behind the importing countries' trade barriers.

Japanese investment in Western Europe set the pattern for this strategy. Beginning in the late 1960s and early 1970s, most of these investments were in plants producing colour television sets. By the 1980s, Japanese firms had to establish overseas facilities for the assembly and manufactures of video recorders and video tape, a shift which reflected the changing sources of friction between the two trading partners. The bulk of Japanese investment in Europe has been in the UK and, more recently, West Germany. Strong government encouragement, financial incentives and a growing market for consumer electronics explain investment in the former country (1) while good labour relations and reliable sources for high quality components are factors in the latter case.

The slump that hit the industry in the late 1970s uncovered new opportunities for foreign acquisitions in both American and European markets and Asian-based firms responded quickly. Recent examples include the acquisition of a German television firm by a Yugoslav conglomerate, the Japanese purchase of a Motorola television division and the erection of US plants by Hitachi, Mitsubishi, Sharp and Sony. Similarly, firms based in LDCs have developed considerable presence in other markets. Here, examples include Taiwan-based Tatung's production facilities in the US and Europe as well as Hong Kong and Singapore and US production of colour television sets by two Korean-based firms, Gold Star and Samsung.

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(1) Several small independent producers in the UK were also anxious to benefit from Japanese technology.

3.5 Moving Upmarket

The industry's continuous efforts to extend both the range of products and their functions amounts to a strategy of gradually moving up-market into higher value items. In its simplest and oldest form, the approach was largely an imitative one, frequently attributed to Japanese producers during the 1950s and 1960s. Initially, they made use of a labour cost advantage since relevant wage rates were roughly one-fifth of the prevailing scale in the US (1). Japanese firms started at the bottom of the technological range by exporting small transistor radios. Gradually, composition of their exports broadened to include television sets (first monochrome sets, then small-size colour models, and, later, larger ones), tape recorders, stereo equipment, video cassette recorders (vcrs) and all the principle components.

However, the Japanese experience suggests that a successful strategy of imitation is dependent on several factors. First, the tactic offers little prospect for firms to achieve a premier position in the field; since it is almost entirely price-based and low price is not a reliable long-term strategy. Second, a successful strategy of imitation requires a large and rapidly growing domestic market, and in comparison to Japan, Hong Kong, South Korea or Taiwan are relatively more dependent on export markets. Moreover, in order to protect their domestic industries, several countries severely restrict imports of consumer electronics. This practice results in local prices which considerably exceed the world price and which further limit the home market. Thus, the latest entrants to the industry may confront a more difficult public policy choice than did their predecessors.

Basic changes in the industry have raised another set of problems for latecomers who wish to follow the technological leaders. As long as there

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(1) B.A. Majumdar, "Innovation and International Trade: An Industry Study of Dynamic Comparative Advantage", Kyklos, Vol.32, Fasc.3, 1979, p.566.

was a number of possible suppliers of technology, latecomers could easily switch partners. But because the European and American producers have yielded so much ground to the Japanese, this option is not so easily obtained. Established producers have also become much more cautious when providing their technologies to new entrants. For instance, the leading Japanese producers of video cassette recorders licensed their technology to South Korean firms on the condition that the partner would not export before March, 1985. Finally, some late entrants are more dependent on foreign suppliers of parts and components than was the case in the 1960s. they therefore stand the risk that their suppliers (often Japanese competitors in the same field) will withhold or delay crucial orders. For such reasons a merely imitative approach offers less promise today than it did twenty years ago.

For producers in countries with a relatively sophisticated technological base, a strategy of moving upmarket offers a richer range of options. There, the most common version calls for firms to introduce product improvements as a way to boost sales or to extend the lifetime of the basic product design. But in such cases, those firms which have previously specialised in, say, either audio or visual equipment may find it difficult to produce an integrated system.

The desire to prolong the life of a basic produce design is not the only reason to move upmarket. In the 1960s major firms made several fundamental decisions based on this rationale which later changed the industry in unexpected ways. American and European producers interpreted the strategy largely in terms of its marketing implications and attempted to push consumers towards the higher-priced and more profitable ends of their product lines. This tactic, which effectively ceded the lower range of product lines to foreign suppliers, had dramatic consequences for the producers of television sets and components. Japan soon emerged as the major exporter of small sets (less than 20 inches) - a market which later

proved to be very important and now accounts for the bulk of sales in western markets. A related consequence was that Western firms lost much ground in the field of television components. by 1980, for instance, no colour picture tubes for small sets were produced in Europe although smaller tubes accounted for around one-third of the cost of a finished set.

3.6 Rationalization

Traditional forms of cost-cutting, such as reductions in the work force or shutting uneconomic plants has been witnessed only rarely among the leading Japanese firms, and never in the case of entrants to the industry. Moreover, the strategy is of only moderate importance for the US where the major structural adjustments to foreign competition were carried out some time ago. Plans for rationalization are more evident in Europe where import restraints have helped to delay the process of structural adjustment. These conditions led to a fragmented pattern of production with many small and sometimes uneconomic units. In 1980, viable production of television sets was put at a minimum of 400,000 units yet several dozen European plants made only 10,000 units per year. Similarly, breakeven point for the production of picture tubes was about one million units although more than one dozen European factories produced a combined total of less than 7 million. Under such conditions it is not surprising that production costs were sometimes twice the level of those incurred in Japanese plants (1). Phillips, Europe's largest manufacturer of consumer electronics, has responded by reducing its workforce from 200,000 to 165,000, by closing almost 20 plants and by transferring production to bigger units.

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(1) The Economist, 20 February 1982.

For smaller firms, however, the strategy of rationalization could be synonymous with exit from the industry. Instead, planners and businesses have called for a "European solution" to their problems. Although vaguely defined, the strategy would presumably entail greater co-operation between European firms but may as well include takeovers or mergers. The proposed takeover of the West German firm, Grundig, by France's nationalized Thomson group was intended to be a centrepiece of the new strategy (1). The objections to that move are indicative of the types of resistance which such tactics are likely to encounter. Phillips, which owned one-quarter of Grundig, regarded the French firm as a direct competitor and opposed the move. Grundig workers feared that Thompson would close down German plants and worried about the loss of sub-contracts to German firms. Moreover, the German cartel office was reluctant to grant approval for the takeover which could give the French more than half the German market for colour television and nearly that proportion of the video market. This experience strongly suggests that intra-European rivalries will continue to be a significant impediment to significant European rationalization.

3.7 International Tie-ups

Attempts to improve a firm's relative position through joint ventures, licensing, market-sharing arrangements and similar tie-ups are of interest to producers which lack the technologies and/or finances to compete internationally. In return, the weaker firms may provide improved market access or distribution channels to their partner. The rising costs of developing new technologies and trade restrictions have pushed firms into more international tie-ups.

This trend will make a European solution even more unlikely since intra-European collaboration can seldom promise advantages to both

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(1) Much of the impetus for this approach can be attributed to the French desire to push European producers of consumer electronics into defensive alliances.

partners. Thus, after blocking French efforts to forge a European solution, Phillips reached an agreement with American Telephone and Telegraph which provided it with access to the latter's technology in exchange for assistance in marketing and distribution. Thomson also opted for a non-European technology when it negotiated a license with Victor Corporation of Japan (JVC) to manufacture video cassette recorders for all markets outside Japan (1). However, one of the major issues currently dominating the video market is the race to establish an industry standard. JVC, which is one of the leaders in this regard, will benefit by consolidating its European position.

In this product line the most significant issue is that of establishing a worldwide standard for videos. Competitors have produced three distinct versions but the joint venture will assist in establishing JVC's version and in consolidating that firm's European position (2). Finally, the need to establish links with technological leaders is essential for firms in LDCs. In their search Korean firms have focused on US sources of technology. Several (Hyundai, Gold Star and Daewoo) have established their own firms in Silicon Valley and have zealously pursued joint ventures and licensing agreements for the production and manufacture of key components. The three versions are video 2000, produced jointly with Phillips and Grundig, Betamex by Sony and VHS which was designed by JVC and Matsushita. The battle for claim to the industry standard has virtually been won by JVC. Grundig now produces and sells its competitor's version. Had it not done so, Grundig's sales of colour television would have suffered since many buy their receivers and videos from the same supplier.

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(1) Previously, JVC had granted licenses only to other Japanese firms.

(2) Currently, JVC's version accounts for 70 per cent of the world market for video cassette recorders.

New tie-ups between developed and developing country locations are also underway in electronic components and capital goods. Singapore is the site for a considerable amount of hardware manufacture now, and the government-sponsored National Computer Board expects the country to become a significant exporter of software too in the future. Moving from assembly-labour-intensive operations to professional labour-intensive services is therefore still another variant in the international allocation of labour cycle.

3.8 Automation and Repatriation

Just as the search for lower costs led to a spate of offshore processing, however, the possibilities of automation in US plants is now leading to a repatriation of certain operations with a consequent slowing-down in electronics industry investment in many parts of Asia. Automated machinery is now able to weld semi conductors or wire integrated circuits to frames. One consultant in Silicon Valley has said "the rise in the use of automated equipment is rapidly dispelling the advantages that used to exist for assembly in Asia" (1). Among the investments shelved in Asia in 1985 are Advanced Micro Devices' enlarged Singapore plant, decelerated work on its Bangkok plant; postponed building by Motorola in Malaysia and Thailand, Mostek closing its assembly plant in Kota Bahru, Malaysia and National Semiconductor closing its plant in Seremban, Malaysia.

What factors lie behind this reversal of the previous flow of work? Automation in the US is one. the impact of this is to cut total unit costs by substituting capital for labour. A second factor is the increasing need to be able to meet very tightly-specified inventory deadlines, delivering products and parts exactly when needed by purchasers moving to just-in-time inventory methods. A third is the fact that shorter runs of specialized products are becoming the norm in the

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(1) Quoted in The Wall Street Journal, August 21, 1985.

industry, as mass markets mature and niche and speciality products become the fastest-growing. Thus, it can be seen that there is a link between the product cycle, location and technology. Whereas once these dictated Asian sourcing, now they are encouraging retention of production in the US.

3.9 Interpretation of the Strategies

This review of the strategic options which various firms in the industry have devised highlights three important characteristics of the industry:

* it is truly restless and immature in production technologies, product life cycles and indeed also in the public policies which attempt to address it. the industry is in continual disequilibrium.

* there is a close and rapid linkage between product demand mix, the technology needed to match that evolving mix, and the resulting plant location decisions and trade flows. The automation and repatriation efforts now witnessed in the US clearly illustrate this.

* even in products which have existed for decades (e.g. TVs) there is a continuing effort by manufacturers to differentiate through technological innovation. Thus, TVs are increasingly being redefined as "an all-purpose display device", with video games, stereo sound, high resolution flat screens, integral VCRs, videodisc capabilities, cable-compatibility, separate audio for multi-lingual transmission, etc. (1). This means that entry, collapse, survival and exit in the industry are all in progress simultaneously, as neither the products nor the processes are "mature" in the conventional sense of becoming standardized.

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(1) EIA, 1985, p.14.

4.0 BUSINESS STRATEGY AND PUBLIC POLICY:

THE CASE OF THE KOREAN COLOUR TV INDUSTRY AND THE USA

As an example of the mingling of corporate strategy and public policy in this immensely fast-changing industry, the story of Korean colour TV exports to the US is illuminating.

In 1976 Korea possessed virtually no colour TV manufacturing capacity. By 1983 its six major producers together were the fourth largest production group (after Japan, the US and West Germany). It took only four years for TV output to grow tenfold in Korea, by which time an OMA, restricting Korean exports to the US to 289,000 units in 1979, was already in place. By 1982, one producer, Gold Star, was building a plant in the US for assembly (both for TVs and microwave ovens), cognizant of the likely future course of trade policy in the US. The last OMA on Korean TVs expired in June 1982, only to be followed by an anti-dumping ruling in April 1984.

Exhibit 3 summarizes the case as it unfolded between 1977 and 1984. It shows that:

* an industry can spring up in a new location and within five to seven years be a major force in the world market.
* overseas capital played a role in the industry's birth in its new location.
* a sequence of steps evolved as trade policy in the US induced assembly within the US by overseas producers, then costs shifted in such a way as to erode the unit cost attractions of overseas assembly.
* strong protectionist measures in the US (notably OMAs) were imposed despite Korean TV imports accounting for relatively low value shares of US apparent consumption - 1.5 per cent in 1980, when the OMA took effect, and 5.3 per cent in 1983. (The corresponding volume shares were 2.7 per cent and 10.3 per cent, respectively.)

5.0 IMPLICATIONS FOR OTHER COUNTRIES

The ways in which trade policy, at the national level, has shaped and been shaped by, international demand and production patterns in consumer electronics is in many respects unique. Other industries have, of course, been affected by trade barriers; obvious examples among manufactured goods would include shipbuilding, automobiles, footwear and textiles. However, there are some significant differences between these industries and consumer electronics.

First, the consumer electronics industry is critically dependent on progress being made in another industry - electronic components. Only as costs have fallen and quality has increased in the output of that other industry have expanded product ranges and lower prices in electronic consumer goods been possible. To take full advantage of this intense technological pressure in its main supplier industry, many manufactures of consumer goods have deliberately remained vertically disintegrated, allowing themselves all the benefits and none of the problems of falling input prices. There are few industries where there is so strong and direct a relationship between inputs and outputs.

Second, the buying patterns at work in the industry appear to have had great influence on its development. There has been, for instance in the case of colour TVs, a close relationship between department store chains and off-price distributors in the US and plant owners in Asian countries. Thus, in many cases plants were erected in Asia with the knowledge that a steady market for their output already existed, so long as they fulfilled the price, quality and delivery specifications agreed to. Here too, some unusual circumstances have helped foster the spread of the industry across the world.

A third aspect of the industry's experience worth noting is that the sensitivity to import penetration persists even though very little US capacity is now domestically-owned, and, moreover, now that only a modest

share of value added in the goods is contributed within the US. As table 3 shows, of the 5 US-owned plants out of the 17 making colour TVs in the US in 1984, US labour accounted for only 7 to 8 per cent of the total cost of production. A further 21 to 24 per cent of US value added is used, along with 36 to 38 per cent US-made parts, but the protection of labour case for protection can be seen to have shrunk.

6.0 SUMMARY AND CONCLUSIONS

The consumer electronics industry is among the most fast-changing in the world. It is nourished by an electronic components industry which is itself in turmoil due to revolutionary production technology, collapsing selling prices and a shakeout among producers worldwide. It is able to draw upon the manufacturing and process technology advances being made by CAD/CAM systems, lower-cost telecommunications and networks, and advances in robotics and assembly procedures. It faces a market (in the developed countries) which, although once characterized as "mature" as penetration rates for household radios, TVs, telephones and audio approached 100%, is now again showing signs of immaturity as interest in new products, new product combinations, and technical improvements drive retail sales increasingly higher. the industry is also being influenced by an increasingly restructured distribution apparatus, with discounters and warehouses bringing their own upheaval. In the midst of competitive forces such as these, it is not surprising that the consumer electronics industry itself is fluid in character.

The future course of internationalization is even harder to predict now than before, given that both product and process are in upheaval. As a final thought, exhibit 4 shows the possible future direction of the industry in the light of some likely technological changes.

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Table 1 World production of major items in consumer electronics, 1965-198

Shares in world total (percentage)

Year	United States	European Community a/	Japan	Centrally planned economies of Europe b/	Developing Asia c/	Other	World total (millions of units) d/
Television receivers (ISIC 383201)							
1965	33.5	24.5	12.9	18.2	0.2	10.7	29.50
1970	18.6	21.3	28.0	20.0	1.5	10.6	44.60
1975	15.6	20.7	22.0	20.6	6.4	14.7	48.30
1981	23.8	14.6	18.8	14.2	16.3	12.3	77.70
1982	14.9	16.2	18.4	15.6	14.6	20.5	69.69
Average annual rates of growth e/							
1965-75	-1.8	6.2	10.7	5.2	49.5	10.0	5.8
1975-81	12.6	1.9	3.3	1.5	26.6	5.5	7.1
1975-82 f/	3.9	0.6	-2.3	1.6	13.2	8.9	3.2
Radio receivers (ISIC 383204)							
1965	27.1	12.8	26.5	8.8	16.7	8.1	86.50
1970	12.2	14.7	29.3	9.7	29.7	4.4	111.50
1975	9.5	10.0	13.1	11.4	49.7	6.3	109.20
1981	7.2	5.5	11.8	10.6	54.4	10.5	128.80
1982	5.9	6.9	11.5	10.5	52.1	12.5	124.71
Average annual rates of growth							
1965-75	-7.2	1.6	-4.1	5.0	16.0	3.3	3.4
1975-81	-3.1	-8.2	-0.7	1.2	3.7	13.1	2.0
1975-82 f/	-7.5	-5.8	-2.2	0	-1.2	13.4	-0.9
Sound recorders (ISIC 383234)							
1965	8.0	8.4	69.7	2.3	0.7	10.9	7.10
1970	1.9	1.9	89.5	2.0	0.9	3.8	23.90
1975	0.5	0.7	80.3	3.4	14.2	0.9	32.50
1981	0.1	0.0	75.3	1.8	22.3	0.5	80.40
1982	-	32.9	51.2	1.6	14.4	0.3	102.58
Average annual rates of growth							
1965-75	-13.1	-9.8	21.3	22.3	55.4	-12.2	19.0
1975-81	-1.0	-30.6	11.8	5.3	25.6	7.5	13.9
1975-82 f/	-0.5	14.2	3.6	0	9.9	2.6	10.7
Sound reproducers (ISIC 383237)							
1965	28.7	30.4	24.0	1.3	1.5	14.1	14.60
1970	18.6	34.4	35.1	1.3	0.9	9.7	21.30
1975	9.0	32.2	36.9	3.3	3.5	15.1	16.50
1981	7.9	13.5	60.6	1.6	3.0	13.4	19.90
1982	8.2	17.2	56.7	1.1	4.2	12.6	16.24
Average annual rates of growth							
1965-75	-9.5	2.8	6.7	14.2	6.9	2.4	1.9
1975-81	-1.0	-12.4	8.3	-7.1	-5.5	2.2	0.9
1975-82 f/	-3.3	-9.2	0.6	-12.9	-8.7	-2.8	-3.7

Source: UNIDO estimates based on Yearbook of Industrial Statistics, vol. II. (United Nations publication), various issues.

a/ Netherlands is excluded in all items, in radio receivers also Greece, and in sound reproducers Belgium, Ireland and Italy are excluded. In sound recorders data cover only Denmark, France and United Kingdom.

b/ In sound reproducers 1965-70 data pertain to Hungary and Poland, beginning 1971 only Poland. In sound recorders data cover only Czechoslovakia, Democratic Republic of Germany, Hungary and Poland.

c/ Estimates for the whole region excluding China.

d/ Excluding China.

e/ Obtained from semi-logarithmic regression estimations.

f/ Arithmetic average growth rate for 1975-82.

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Table 2.

Trade in major items in consumer electronics and components, European Community, United States, Japan and Developing Asia, 1970 and 1982

Trade partners	European Community a/ Exports 1970	Exports 1982	Imports 1970	Imports 1982	United States Exports 1970	Exports 1982	Imports 1970	Imports 1982	Japan Exports 1970	Exports 1982	Imports 1970	Imports 1982	Developing Asia b/ Exports 1970	Exports 1982	Imports 1970	Imports 1982
Television receivers (SITC 7241)																
World, millions of dollars	259	1,290	144	1,388	57	224	315	806	384	1,620	-	6	9	708	44	267
Per cent																
(World share)c/	(31)	(29)	(19)	(36)	(7)	(5)	(42)	(21)	(47)	(37)	(-)	(-)	(1)	(16)	(6)	(7)
European Community	33	52	58	48	-	2	-	1	5	11	5	9	2	20	13	2
United States	d/	1	-	1	...	...	...	...	70	22	18	10	72	38	12	1
Japan	-	-	12	13	-	1	81	34	...	...	...	...	2	1	56	60
Developing Asia	2	1	-	9	-	-	-	31	6	9	-	41	3	10	10	27
Radio receivers (SITC 7242)																
World, millions of dollars	187	469	162	1,415	21	105	479	1,998	695	2,401	2	59	107	1,395	67	390
Per cent																
(World share)	(17)	(10)	(16)	(27)	(2)	(2)	(46)	(38)	(62)	(51)	(-)	(1)	(10)	(30)	(6)	(7)
European Community	36	63	38	19	9	3	2	-	7	16	9	-	16	25	5	1
United States	4	1	1	-	...	...	...	...	70	22	18	10	72	38	12	1
Japan	-	-	12	13	-	1	81	34	...	...	...	...	2	1	56	60
Developing Asia	-	1	10	31	4	1	14	30	6	10	13	51	4	5	6	10
Sound recorders and reproducers (SITC 8911/1)																
World, millions of dollars	255	641	215	2,850	65	270	398	2,099	466	5,769	11	15	2	357	35	538
Per cent																
(World share)	(28)	(9)	(23)	(39)	(7)	(4)	(43)	(29)	(50)	(80)	(1)	(-)	(-)	(5)	(4)	(7)
European Community	34	47	35	8	48	27	13	2	9	38	35	11	4	24	9	1
United States	18	6	9	1	...	...	...	...	57	28	57	29	17	41	3	2
Japan	1	-	20	46	8	4	83	83	...	...	...	...	20	2	71	91
Developing Asia	1	1	-	3	3	4	-	7	6	7	3	40	46	7	-	3

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Table 2 continued

Trade partners	European Community a/ Exports 1970	European Community a/ Exports 1982	European Community a/ Imports 1970	European Community a/ Imports 1982	United States Exports 1970	United States Exports 1982	United States Imports 1970	United States Imports 1982	Japan Exports 1970	Japan Exports 1982	Japan Imports 1970	Japan Imports 1982	Developing Asia b/ Exports 1970	Developing Asia b/ Exports 1982	Developing Asia b/ Imports 1970	Developing Asia b/ Imports 1982
	Tubes, transistors and other electronic components (SITC 7293)															
World, millions of dollars	459	2,765	686	4,005	542	4,130	224	4,570	86	2,686	109	747	83	3,459	41	4,262
Per cent																
(World share)	(31)	(20)	(45)	(25)	(37)	(29)	(15)	(28)	(6)	(19)	(7)	(5)	(6)	(25)	(3)	(27)
European Community	51	50	32	35	33	15	13	5	11	16	3	8	7	14	7	6
United States	7	10	34	25	...	...	...	...	35	30	81	54	71	51	60	46
Japan	-	1	1	11	16	5	14	16	...	...	...	...	10	6	19	18
Developing Asia	-	9	2	13	15	56	39	63	12	30	8	22	9	26	11	25

Source: United Nations Statistical Office, Series D, Trade Tapes, SITC Revision 1.

a/ Excluding Greece and Netherlands.

b/ Hong Kong, Republic of Korea, Malaysia, Philippines, Singapore and Thailand.

c/ Excluding centrally planned economies and other countries which did not report trade at this level of aggregation.

d/ Less than one million dollars or one per cent.

e/ Not applicable.

Table 3

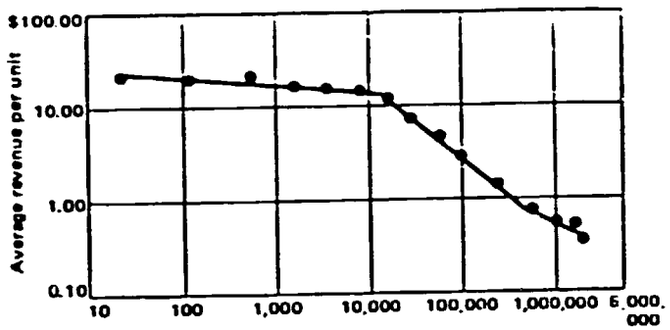
Purchases of US and Imported Components and Value Added by Manufacture in the US, 1980-83, for Colour TVs, Percentages

	1980	1981	1982	1983
Purchases:				
Imported:	32.4	34.8	32.1	31.5
US Made:	36.3	36.9	38.1	37.2
US Value Added:				
Direct Labour:	8.6	7.8	8.1	7.4
Other Value Added:	22.7	20.3	21.7	24.2
Total:	100.0	100.0	100.0	100.0

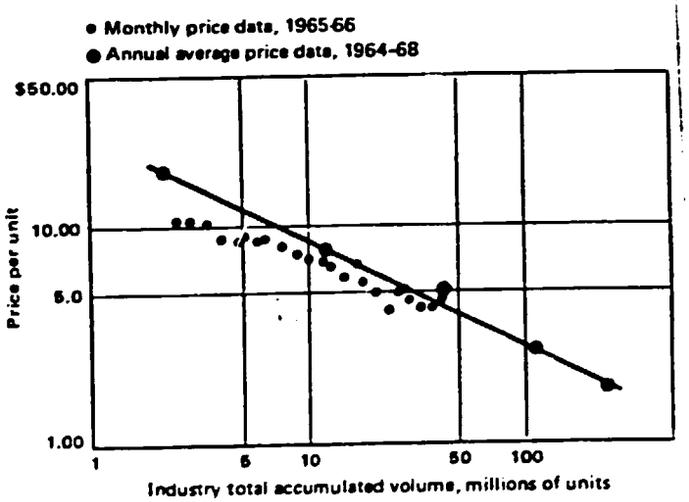
Source: USITC, p.A-105

Note: Due to rounding, figures may not add perfectly.

Exhibit 1



Revenue curve for silicon transistors during the period from 1954 to 1968.



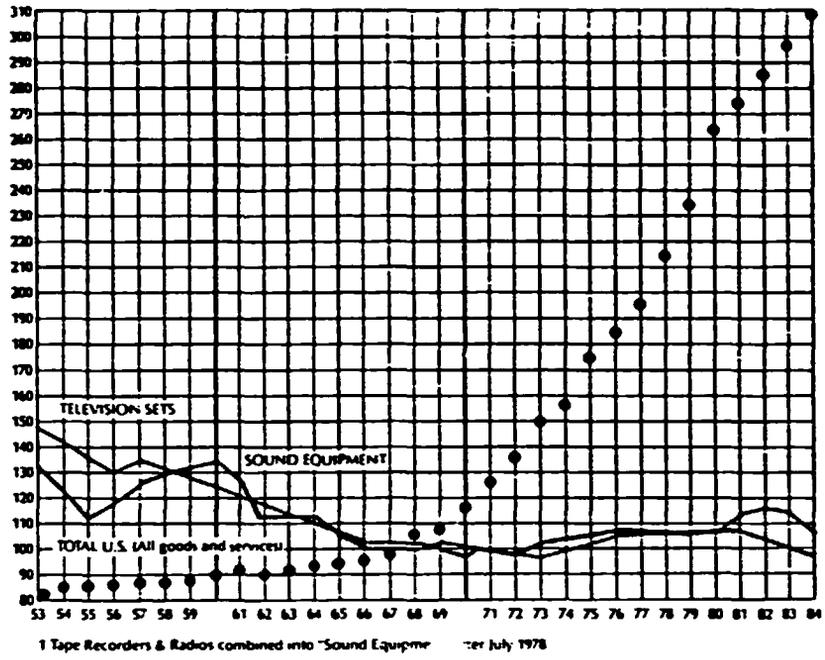
Price curve for integrated circuits.

Experience Curves

Source: "Experience Curves as a Planning Tool," Boston Consulting Group, Boston, Special Commentary, 1970.

Exhibit 2

ANNUAL CONSUMER PRICE INDEX
BY PRODUCT TYPE (1957 = 100)
UNITED STATES, 1953-1984



1 Tape Recorders & Radios combined into "Sound Equipme[illegible]er July 1978

Source: Electronic Industries Association

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Exhibit 3

Forces at work in the Korean television industry and its exports to the United States

Year	Sets per man-hour produced in US a/	Trade policy	US buyer patterns	Investment	US employment in colour televisions
1977		October 1977 - OMA on Japanese colour televisions.	Discounters, buying groups looking for new supply sources	Korean colour TV capacity established	
1978					
1979		February 1979 - OMA on Korea, Taiwan		Six firms producing in Korea: colour broadcasting from 1980	
1980	.254	OMA on Japan expires in June 1980; OMA on Korea 325,000		$48.4 million $71.7 million	20,211
1981	.274	OMA on Korea 575,000 renewed plus Taiwan		$71.7 million	19,400
1982	.284	OMAs expire in June 1982		$73.2 million; Gold Star of America Inc. opens US plant	17,572
1983	.332				18,023
1984					

a/ Output in Japanese owned firms is higher than for other US producers.

Exhibit 4

Trends at work in consumer electronics industry to affect future internationalization

Activity	Trends	Implications
product design	* availability of lower cost CAD/CAM systems allows quicker, cheaper product development and enhancement.	* product life cycles can be shortened - implies need for even closer ties to plants. * new entry into industry less costly and risky.
component design and production	* microcircuitry costs to consumers falling.	* share of product cost accounted for by design, assembly and distribution due to rise relative to components.
final assembly	* robotized or automated assembly cheaper per unit than before; "zero defect" products now expected by marketplace.	* labour costs as location determinant to diminish importance.
distribution	* discount stores specialise in gaining share by 'grey market' items and low overhead.	* traditional distribution systems under threat: implies rush for lower cost at factory gate will intensify.