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Information Revolution In Taiwan: Economic Concerns And Beyond

By

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INFORMATION REVOLUTION IN TAIWAN:
ECONOMIC CONERNS AND BEYOND

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It may be exaggerating the issue to say that information revolution is a product of economic development. But there is little doubt that the two are closely related. In many of the early works on information revolution, the concept is described in economic terms such as production, distribution and values (Masuda, 1981, p. 29; D. Bell, 1980, p. 178). And the percentages of work force distributed in different economic sectors, i.e., agricultural, manufacture and services have often been used as an indicator of societal transformation.

This close association of information revolution with economic activities has brought suspicion that it is indeed a drastic change from the industrial capitalist society that we are so familiar with. To challenge the concept, R. Williams (1983, p. 83) argued that information revolution is but a continuation of the industrial revolution. But even in his objection, Williams recognized the role of economic development in the social changes that are currently underway.

By now social scientists have more or less outlined the major features of an information revolution, or even that of an information society. But the impetus which lights up the process of change, the social economic background against which changes are taking place, and strategies for change in developed
nations and developing nations are quite different. In this respect the Taiwan experience is especially worthy of attention.

In the past few decades, Taiwan has emerged as a newly industrialized nation with an attractive track record in economic development. While most of the developed nations such as U.S., United Kingdom, Japan were suffering from inflation and recession in the 1970s, Taiwan, together with a few other countries in Southeast Asia managed to maintain a high level of economic growth.

More impressive, perhaps, is Taiwan's ability of maintaining growth in the face of major setbacks in international politics. In 1978, Taiwan was "derecognized" by U.S.; it has lost
membership status in all but one international organization: the Asian Development Bank. But economy seems to thrive despite difficulties; economic growth rate was 7.14% in 1983, and a rate of 7.5% is projected for 1984; per capita income reached $2,673, about ten times that of China mainland, and in 1983, Taiwan was the sixth largest trading partner of U.S. (Taylor, 1984, p. 38).

For a resource-poor island nation of the size of Maryland but population over 18 million, Taiwan has in the past been relying heavily on international trade for economic growth. Record shows the strategy worked, but not without drawbacks. Taiwan has not only become very sensitive to ups and downs in world economy, the ability of maintaining growth and stability virtually depends on the competitiveness of its good in the international market. As computer and telecommunications began to emerge as the driving force of post-industrial societies, Taiwan was forced to quickly change its industrial and economic infrastructure for two major reasons:

1. As labor costs kept rising and labor productivity reached the ceiling point, "Taiwan has no choice but to get beyond its low-wage manufacturing base and develop knowledge- and capital-intensive industries" as Minard put it (1984, p. 36). Taken available resources into consideration, one area that Taiwan can develop in the competitive world market is what has been generally referred to as the "strategic industry" in government policy statements (Economic Development, 1983), including information technology and electronics.
2. As pointed out by Clutterbuck (1983, p.25), "Information technology is vital to a trading economy...because effective trading depends heavily on information..." Only in recent years has government, businessmen and journalists in Taiwan begun to realize that Japanese business information agencies had a great deal to contribute to the gigantic trade deficit of Taiwan to Japan. Quick and accurate market information to keep Taiwan active in world trade has become an essential factor in its future growth.

Is Taiwan prepared to meet the challenge of information age? What does the communications infrastructure look like now and what are the major policy issues? What is the economic, social and cultural setting against which viability of various information technologies will be tested? And most importantly, what are the economic impact of information revolution? This paper represents an attempt to answer at least some of the important questions from a historical perspective. Hopefully the effort will be helpful for us to understand the growth patterns of information technologies in a newly industrialized nation such as Taiwan, identify important factors influencing such growth, and its significance to Taiwan's future in an information age.

The following discussion will begin with a description of Taiwan's economic development and social change over the past thirty years since the fall of Mainland China, followed by a critical analysis of its communication systems, and then concluded with a look at the future prospect.
ECONOMIC AND SOCIAL SETTING

Rapid growth characterized with stability and equity are the major features of economic development (Pryblya, 1978) which brought Taiwan to the attention of many developing nations. For example, in 1951 when land reform was still underway, the annual increase in GNP was 12.05%. A drop was observed from 1953 to a low of 5.5% in 1956. But thereafter the growth rate was maintained around 7% until a high growth period emerged from mid 1960s to mid 1970s as industrialization was in full gear and export market thriving. World wide oil crisis brought inflation at a all-time low growth rate in 1974 (1.12%), and a second lowest point in 1982 (3.9%) was attributed to world economic recession and growing protectionism in international trade. But in both cases recovery came before very long. Average growth rate in the 1950s (8.2%), 1960s (9.1%) and 1970s (10.0%) shows a steady increase overtime. Despite a rapid population growth before 1960s (.35%), real GNP in 1980 was eleven times the real GNP in 1952 (Kuo, 1982, p. 7).

A similar growth pattern is observed in terms of per capita income; while in 1960 it barely went over US$100, the figure rose four times as much in 1972 (US$482). In 1983, per capita income was well over US$2,500, about 50 times of that in 1949.

Together with a rapid and stable growth, Taiwan's economic development has been noted for its achievement in narrowing the gap between the rich and the poor. Records showed that in the 1950s, ratio of income share of
The ratio of income distribution between the top 20% to that of bottom 20% was 20.5, very similar to that of other developing nations plagued by the inequality of wealth distribution. But by 1972 the ratio was down to 4.6, and stayed at that level. This narrow gap among income groups put Taiwan in the category of "low inequality" countries along with U.S., U.K., Canada, Japan, Korea and Spain. As a result, a large middle class emerged which in turn contributes to Taiwan's social stability.

Closely associated with equity in growth is the unemployment rate. Unemployment, long regarded as a barrier for economic growth in both developing and developed nations, has remained low for years in Taiwan. The highest unemployment rate was observed in the early 1950s when a large number of newcomers from Mainland China were added to the population. The unemployment rate soared to a high point of 6.5% in 1952. But as industrialization began to take place, newly created job opportunities in urban cities managed to absorb the new comers as well as the outmigrated agricultural labor force, and the unemployment rate began to drop. As Figure 1 shows (Kuo, 1982, p. 15), from 1965 to 1968, the unemployment rate dropped about 3%, and remained low with small fluctuation throughout 1970s. In 1982, the unemployment rate was approximately 2%.

How was this high rate of economic growth possible? One answer lies in Taiwan’s constant search for viable means of survival. As an agrarian fiefdom before World War II, Taiwan did not have much resources to begin with. Arable land was only one quarter of the total land area. In 1949, the island’s per capita income was less than $50 (Minard, 1984). But with a successful land reform instituted in 1949 to 1953 and vigorously planned
economic policies since 1953, Taiwan has achieved a rather smooth transition from a primarily agricultural economy to a labor-intensive industry in the late 1950s, and is currently undergoing another transition into a knowledge- and capital-intensive industry.

This transition in economic structure shows up in two aspects: production and labor force. Figure 2 shows that in 1982, industry accounted for the largest portion of gross domestic product (49%), compared with a low of 22.5% in 1952. By contrast, agriculture dropped from 32.4% in 1952 to only 7.4% in 1982. The service sector, which by definition includes government, transportation, commerce, banking services and other tertiary industry activities, stayed stable over the years (Economic Development, p. 9) with around 43% of the GDP.

The drop of the agricultural share of GDP, however, cannot be attributed to a lower labor productivity. Table 1 shows that (Kuo, p. 18) overall annual growth rate of labor productivity, including that of agricultural labor force in Taiwan had a big increase from 1952 to 1968. But with technological, managerial and educational improvement, the agricultural and the service sector began to catch up. It is noticeable that although leading by just a narrow margin, productivity of the service sector is the highest from 1968 to 1978.

A close look at the industry structure also reveals changes over time (Economic Development, 1983). In the 1950s, emphasis was put on processed food items and light industries such as textile and glass. In 1960s, the focus was switched to electronic appliances such as television sets,
refrigerators, radios and air conditioners, and petro-chemical products such as plastic, chemical fertilizers began to grow. Heavy industry, including shipbuilding and steel were the major items in 1970s. But in the next decade, information, machinery and allied industry will be the focus of promotion and development.

The recent expansion in the service sector may be more visible when the employment structure is examined. As shown in Table 2 (Kuo, 1981, p. 15), service sector which accounted for 28% of the total employment in 1952 as industrialization was about to begin in Taiwan, took up 40% of the share in 1982 (Economic Development, 1983). Although still low compared with Singapore, it is almost the same as that for the industry sector in Taiwan (41%). The drop in agriculture was dramatic—from a 50% of the total employment in 1962 down to 19% in 1982.

A further breakdown of the service sector shows that over a stretch of 30 years, the most dramatic increase in the percentage of employment belongs to the insurance, finance and business services—from .13% in 1951 to 2.43 in 1982. Other noticeable increases include transportation and telecommunications, from 3.0% in 1951 to 5.71% in 1982; and business, from 10.78% to 17%. In terms of distribution of employed persons by occupation, the greatest increase is in the "administrators, managerial and executive" category—the percentage almost tripled in 30 years—from .28% in 1951 to .78% in 1982. Increase in the "professional and technical" category is also remarkable—from 2.48% in 1951 to 5.69% in 1982, and is still on the rise.

Another interesting development is observed in the percentage of
employment in the manufacturing sector, and also in that of the blue collar workers. In both cases, the curve seemed to have reached a ceiling point in the late 1970s, and are beginning to taper off, as is shown in the 1981 and 1982 figures (Tables 3 and 4).

A similar pattern of growth is observed in foreign trade. As a live-line to Taiwan's economy, the shares of exports and imports in GNP were 50% and 46% respectively in 1979. With industrialization, a marked change took place in exports composition over time. Agricultural product which accounted for over 90% of exports in 1952 dropped to 8% in 1982, while industrial product exhibited a reverse trend; the percentage rose from a low of 8% in 1952 to 92% in 1982.

Since productivity in the agricultural sector has been rising as shown in Table 3, the drop in agricultural output in Taiwan's economy can be explained by the withdrawal of labor force.

According to Bell (1979, p. 168), post industrial societies are characterized by a "service economy." As observed by Minard (1984, p. 42), "a transition (of Taiwan's economic structure) is already underway." Will the transition be smooth? What are the barriers for such a move? According to Hsu Li-teh, the Minister of Economic Affairs, there are several problems to be concerned about in terms of Taiwan's future economic growth. Those directly related to the transition to a service economy include (World Daily, July 2, 1984, p. 2):
1) The existence of a large number of small to middle size business firms which place little emphasis on long-term investment, not to mention research and development. In order to make profit they often resolve to pirating.

2) Government monopoly and numerous regulations weakened competition in the service sector. An unhealthy infrastructure led to slow growth and profiteering in this area.

3) A lack of investment interest among capital holders led to a surplus of savings.

Undoubtedly if Taiwan is to maintain or surpass its records, solutions have to be found for the above-mentioned problems. Since many of them are deeply imbedded in the economic structure, solutions are not likely to come by easily. But over the years, there have been enough economic growth to bring prosperity and better life to average people. For example, Table 5 (Economic Development, 1983, p. 42) shows over 30 years, there are substantial increase in each of the social indicators, including life expectancy, daily per capita intake of calories and protein, living space, the percentage of automobile owners and households with electricity.

Changes have also been observed in family spending patterns. According to statistics, in 1951, an average family in Taiwan spends 60% of the total income on "necessities" such as food and utilities. Ranked second largest expenditure item was "appliances", taking up another 11%. By contrast, "education, entertainment and cultural activities" occupied a meager 6%.
But by 1978, "food" item went down to 40.42%, and continued to drop to
34.58% in 1982. Appliances exhibited a similar decline—down to 3.06% in
1982, only one-third of the rate in 1951. On the other hand, the
proportion of income spent on "education, entertainment and cultural
activities" doubled in thirty years and reached 13.55% in 1982.
Substantial increase is also observed for transportation and
telecommunications, from 1.39% in 1951 to 4.08% in 1982.

The change in spending pattern indicates that with improved income,
average families in Taiwan can now afford to, and also are more willing to
spend on knowledge, information and leisure. Changes in other spheres of
the society are therefore predictable.

Although not a part of economic activities, education is directly
related to economic development, especially when technical and professional
workers are becoming an increasingly important occupation group.
Statistics show that in 1982, Taiwan's literacy rate was 90%, and 99.76% of
all school age children were attending schools. With nine-year obligatory
education instituted in 1968, 97.41% of the elementary school graduates
went on for secondary education in 1981 as compared with 31.99% in 1950.
While the percentage of junior high graduates entering senior high schools
fluctuated through the years (68.6% in 1981), there was a 10% increase in
the number of high school graduates entering colleges—from 72.5% in 1950
to 82% in 1981. Compared with the figures in 1961-1962 school year, the
number of students enrolled in universities and colleges in 1981-1982
school year went up six times, while the number of senior high school
students increased by 450%. In the 1981-1982 school year, Taiwan's
students accounted for one quarter of the total population (Economic
Development, p. 23). By world standard, the educational level of average people in Taiwan is among the highest (Mirando, 1984). What is now needed from the education system is a greater supply of well-trained researchers capable of breaking the bottleneck of scientific development in Taiwan (World Daily, July 2, 1984, p. 2). A great emphasis is therefore now placed on the growth of high-technology programs and institutions instead of basic training.

As information age is approaching, communication system which is essential to the flow of information also became a key factor in development and growth. A critical analysis of the communication system in Taiwan will show that in the process of expansion, it does not only reflect, but has closely interacted with societal changes over the past thirty years.

THE COMMUNICATION SYSTEM

Telecommunication has traditionally been regarded as separate from mass communication. Although telephone, telegraph and telex also facilitate communication among people, they lack the unique characteristics of mass media: the capability of conveying messages to an almost unlimited number of audience. However, things are changing. With the advent of information technology, telecommunication and mass communication seem to be converging to formulate a new system. The discussion in this section will therefore include the development of both the mass media and telecommunication media.

Over the past thirty years, the most striking feature of the development of Taiwan's communication system is rapid growth. Stimulated by economic boom, the number of telephone per 1,000 persons rose 63 times.
3.9 in 1952 to 248 in 1983 (Telecommunications Today, 1983). The growth rate was 11.75% from fiscal year 1982-1983. Long distance dialing service is now open to some international and all domestic distance callers.

As to the use of telegraph, a decline of domestic exchange is noted to the growth of packet switch service and direct dialing phone calls. A similar decline is reported on the uses or national telegram exchange service. In 1983, the growth rate scored a negative 10.71%, but the facsimile service is still popular among business with a net profit of 44% over the previous fiscal year in 1982.

Communications is becoming one of the fastest expanding government rises in Taiwan. It is also the focal point of economic development in the 1980s. An effort of renovating the system is now quietly underway.ample, despite the recent decline in telegraph uses, automation was in by using intelligent terminals capable of processing the Chinese ge. And in some places, phone lines were replaced by coaxial cable facilitate digital communication. As Taiwan has already succeeded in using optical fibre, it may be a matter of time before the entire is wired for broadband communication purposes.

The digital communication network is now at an early stage with 3,709 als islandwide (1983 figures). But with the prices gradually going nd the trend of office automation and computerization, its popularity predicted. Other telecommunications networks now being considered
or tested include videotex, teletext, cellular radio and two-way cable television.

Closely related to the development of telecommunications network is automation and computerization. Figure 3 (Wei, p.66) showed the need for change is emerging from within the present industrial infrastructure. After an impressive productivity increase during 1960s and 1970s, the gap between wage and productivity grew larger almost every year since 1973. While labor productivity seemed to have reached a ceiling point in 1978, wage hikes is climbing out of proportion. Without automation to curb production cost, Taiwan will soon lose edge in international trade.

Strictly speaking, computerization in Taiwan began in 1961 with the first computer imported into the country. Up until June 1984, 2011 computer facilities were in use with government offices as the heaviest users. In terms of expenditure on computer per ten thousand persons, Taiwan is still falling behind most industrial nations, including Hong Kong and Singapore (Table 6) (Information Development Plan, p. 867). A breakdown of information workers by occupation also showed that computerization is still an area to be developed. Figures in 1980 indicate that the largest percentage of information workers are system operators and coders (43.7%). System analysts, designers and programmers took up 29.7% of the total, much lower than that of Japan's (48.4%) in the same year. But computer products have been among the fastest-growing imported items with an average growth rate of 33.8% from 1978 to 1980 (Information Development Plan, p. 866). And the market for personal computer has also been growing rapidly.
Computerization may have been progressing at a slower pace than it is in other countries, but the concept is not new, unlike automation. In an interview, Li Kuo-ding, Minister Without Portfolio, Executive Yuan, also the major proponent of information science in Taiwan admitted that industry automation did not begin until 1982 (Young, 1984, p. 2). A survey of four major export industries: electronics, machinery, textile and plastics showed that many factory owners did not have adequate knowledge about automation, some did not feel the need, while others did not have the know-how to undertake the task (Wei, 1984, p. 68). In 1983, a seven-year government project (1982-1990) became effective. The purpose is to push for automation in five major industries: food processing and the four previously surveyed ones. The total investment will reach an estimate of US$7.41 billion. At the same time a "Task Force for Industrial Automation Services" was set up by the Ministry of Economic Affairs to provide industries with free consulting and assistance. Statistics showed a drastic increase in the number of automation specialists per 100 factories from 1981 to 1983 (Table 7) (Young, 1984, p. 2). But according to analyst (Wei, 1984), so far the major achievement was identifying problems such as inefficient management, the lack of emphasis on computer software and unemployment associated with automation which will have to be addressed at before automation can be implemented.

Office automation was also advocated by Sun Yun-suan, the then Prime Minister in his 1982 opening speech of the "Information Exhibition Week." In 1983, three government offices were chosen for experimentation of office automation. Just as industry automation, problems were found to be in the way for improvement: e.g., the difficulty of inputting Chinese language to
the computer system, the lack of legal status of computer generated
documents, cost-benefit considerations and access to digital communication
network. Obviously it is gradually becoming clear that computerization and
automation cannot be accomplished by just purchasing the hardware.

Just as telecommunication, the growth in mass media has been
phenomenal in Taiwan over the past three decades. Among all, television is
perhaps the most "visible," and also the most criticized one.

Taiwan's television broadcasting began in 1964, with the birth of the
Taiwan Television Company. Two others, the China Television Company and
the China Television Service joined the business within the next six years.
Color broadcasting was begun in 1967. According to statistics, in 1982,
there were approximately 3.7 million television sets in use (Introduction
to the Republic of China, 1983), and an average of one set per five
persons, as compared with 1.4 set per 1,000 persons in 1964. An islandwide
survey in 1982 showed that of all the respondents, 83.6% reported having
one, or more than one television sets at home. The average viewing time was
2.43 hours. Another survey conducted in 1983 showed that over half (52.6%)
of the respondents watched television daily (Chi, 198).

The importance of television is equally pronounced in terms of
advertising revenue. In 1980, advertising revenue of the three stations
reached a total of US$73.8 million. The average annual growth rate was
11.66%, increased seven times in ten years. Although all newspapers
combined attracted more advertising revenue, individually television
stations are among the best money-making media in Taiwan.

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Although may not be getting as much attention, newspapers are also a major media for information and entertainment in Taiwan. Due to a shortage of paper supply, the number of newspapers in Taiwan remained the same over years—31. Since late 1940s, there are, however substantial growth in terms of circulation and advertising revenue. There is to date no circulation audit bureau in Taiwan, but according to estimate based on paper consumption, total newspaper circulation was about 3.7 million in 1982, 2.8 times as much that in 1971 (Introduction to the Republic of China, 1983). There is an average of one paper per five persons, that is, about one paper per family.

In terms of advertising revenue, the growth is also substantial. According to Publications Almanac(1981), the total amount of newspaper advertising revenue was US$13.43 million in 1971, growth rate was 5.25%. In 1980, the total reached US$110.5 million, with a growth rate of 35.9% over that in 1978.

In addition to growth in circulation and advertising revenue, recent development shows changes are quietly underway with the newspaper business. For example, the number of newspapers stayed the same, but enterprises owning more than one newspapers began to emerge. National papers began to print local editions which had a strong impact on community newspapers, and color printing and computerized type-setting are among the significant technical development.
Magazines in Taiwan have in recent years been struggling to survive in a rather limited marketplace. However, according to government statistics, altogether 2,600 magazines were regularly published in Taiwan in 1981. Jen Jwo-suan attributed this to the common practice for organizations and companies to put out in-house publications, and the difficulty in obtaining newspaper publication license (1981). With a limited market, magazines in recent years are increasingly specialized. They also became the major channel of expression for political interest groups.

In terms of penetration rate, radio undoubtedly ranked first in Taiwan. In 1981, there were ten million radio receivers islandwide, average a set per two persons. The number of radio companies reached 31, with a total of 141 stations, including both private and government-supported ones.

Since FM radio broadcasting began in 1968, radio stations became a mass medium for high quality music. Similar to what happened to magazines, program content also became more and more specialized aiming at specific groups of listeners, e.g., taxi drivers, farmers.

Compared with available statistics from developed nations, Taiwan is behind Japan, North America and major European nations in the spread of mass media and telephone (Table 8). For example, by 1979, the number of radio sets in U.S., Canada and U.K. have reached one, or over one set per person, but it was half of that—one per two persons in Taiwan. A similar pattern was found with the number of newspaper copies per 100 persons; Japan in 1979 and U.K. in 1981 had over twice as many as Taiwan did in
1981. As to the number of television sets per one thousand persons, the figure amounted to 635 for U.S. in 1979, 3.3 times that of Taiwan's in 1980. In Canada, U.K., Australia and Japan were at least twice that of Taiwan's.

The outlook is changed, however, when Taiwan is put to comparison with other newly industrialized nations such as Brazil, South Korea, Singapore and Hong Kong. While the difference may not be substantial and data incomplete, figures shows that Taiwan is leading most of the above-mentioned nations in the spread of newspaper and radio sets. Although trailing behind Singapore and Hong Kong in television and telephone, the gap is not as wide compared to that with the first group of nations.

The communication system in Taiwan therefore can be described as fairly extended, fast expanding and also booming. But what are the driving forces and limitations of such a system? And how is it going to change when and if new technologies are brought in? In order to examine the above questions without losing sight of the whole picture and its dynamic nature, the system theory is used as a basis of analysis.

It is almost trite to say that the communication system is an open system. According to Bertalanffy (1968, p. 141), an open system is defined as "a system in exchange of matter with its environment, presenting import and export building up and breaking down of its material components." Based on this definition, key elements in a communication system can be identified: communication media as components, social economic setting as
the environment, media policy and investment as import or input, and media content as export or output. Since socio-economic setting and communication media have already been discussed earlier in the paper, the following discussion will be focused on system input, mainly communication policy, and system output, mainly media content.

System Input

System input may be consisted of a great variety of things. For a communication system, it may include ideas, investment, talent, technology know-how, or even audience feedback. But of all things considered, policy stands out to be the most influential item for it regulates and monitors the development of a system, at times even shapes its infrastructure. "Communication Policy," however, does not always have a clear picture to it. As pointed out by Yu (1982, p. 19), "...no country gets into the communication policy business with a clean slate." Most of the time, it is just "...the consequence or reflection of an endless process of contradictions, contingencies and compromises in a continuing conflict and chaos. What emerges as a policy may sometimes give the appearance, at least to outsiders, of a product that is carefully researched, consciously formulated, and clearly reflecting the deliberations. Behind the appearance one may discover a process of political struggles, ambitions, personal and institutional rivalries, ideological clashes and all of ambiguous compromises. Sometimes a 'policy' is just a country's posture or position on a particular issue." (Yu, 1982, p. 19-20)

In the case of Taiwan, a definition of communication policy would
probably come closest to what Yu termed, "a country's posture or position on a particular issue." In the past three decades, there have been economic policies and economic planning in Taiwan, but rarely do people hear about, or even pay much attention to communication policy. It would therefore be futile to attempt at an indepth discussion of "communication policy" per se. However a discussion of key issues relating to policy is still possible, and under the circumstances, may be essential to the understanding of the system and its operation. A quick search of the literature on communications policy research shows that at least three key issues are worthy of some attention here: ownership pattern, regulations and control, and future planning.

1. Ownership Pattern

As other basic service industries, telecommunication is put under government monopoly in Taiwan. The Bureau of Telecommunications under the Ministry of Transportation is responsible for the implementation, operation and maintenance of the telecommunications system. Along with fast growth in the area, the Bureau of Telecommunications itself is expanding, especially in areas of training and research and development. Two research institutes, the Institute of Telecommunications and the Institute of Digital Communication, and a training institute were established to meet demand. Directorate General of Bureau of Telecommunications, P. C. Chen pointed out that the total investment in telecommunications in the coming decade will reach an estimate of nine billion dollars (1982, p. 32). The budget is subject to approval by the Legislative Yuan.
While telecommunication is put under government monopoly, the situation with mass media is much more complex. Take radio broadcasting companies and newspapers for example, private and government-supported ones openly compete for audience and advertising revenues. Although government-supported media hold advantages in some respect*, the two largest dailies in Taiwan are both private.

*All of the government offices are required to put the party newspaper the Central Daily News on top of the subscription list, and military outfit subscribe to the Young Soldiers Daily.

Least government participation is probably seen in the market of magazines. Although government offices put out in-house publications, almost all of the magazines on the market are published by private groups, including those by dissident groups which utilize magazines to advocate political ideas.

In terms of ownership, television companies in Taiwan are probably unique in many ways. They are neither private nor public. All three networks were invested, or partly invested, as is CIV, by different branches of the government offices. The higher-ranking executives are usually appointed by the government. But as broadcasting companies, they operate strictly on commercial principles. As some critiques argued, they are often "more commercial than commercial media" with money-making as the ultimate concern. Past efforts in pushing for reform often became fruitless partly due to this unique nature of the enterprise.
The ownership pattern of communication media in Taiwan is therefore a mixture of government monopoly, private business, government affiliated and government-invested commercial operations.

2. Regulation and Control

Three different sets of laws have served as the bases of regulation and control of communication media in Taiwan: the Publications Law, the Broadcasting and Television Law, and the Telecommunications Law. These laws stipulate the definition of media in concern, procedures of license application, or government offices in charge such as in the case of telecommunication media, and legal or administrative punishment for violation. Censorship of media content is still in existence, but more relaxed in recent years.

Although all of the major communication media are now put under regulation and control, laws have been developing at a much slower pace than communication technology. Pressured by the piracy problem, the Copyright Law has recently entered the last stage of revision. But television, for example, was in its twelfth year of existence by the time Broadcasting and Television Law was finally implemented. And in three to four years, it was found to be incapable of handling new development
in media technology such as video recorders and cable networks.

Sometimes there is also confusion as to which government office is responsible for what. Broadcasting Law, for example, was first drafted by the Government Information Office (GIO), then handed over to the Ministry of Education, but was eventually turned back to the GIO. The situation becomes even more complicated when violations occur. In order to clean up unlicensed cable operators, coordination was necessary among at least three different government offices: GIO, the Bureau of Telecommunications and police authorities. At times such problems weaken the effectiveness of law enforcement.

Problems also worsen when the division of labor among government offices is not adequate. In terms of building the infrastructure of an information industry, eight government offices are involved with each responsible for a specific task. The Ministry of Transportation, for example, is charged with the job of setting up a nationwide telecommunications network, but the responsibility of regulating information content and licensing lies with the GIO. Conflicts of viewpoints and coordination problems flared up as the two government agencies recently took drastically opposite sides over the issue of two-way cable television.
3. Planning

Some twenty years ago, government took the initiative in developing a television network, today it is still playing the role of prime mover in building an information system. In the Four Year Economic Plan, it was clearly stated that the development of "strategic industry" will be the emphasis of development in the 1980s. And in the 1980-1989 Development Plan of Information Industry, two strategies listed were: developing domestic market to help the growth of information industry, and developing know-how to promote export.

Several major projects are currently underway in pushing the nation toward information age. The Hsin Chu Industry Park, for example, is set up in 1980 to attract investors and scientists in developing knowledge-intensive information products. Applicants are offered benefits such as tax exemption and low-interest bank loans. Another activity which has attracted much attention lately is the project carried out by five leading companies in the computer business world. Stimulated by IBM's aggressive sales strategies, the "Big-5" have in a joint effort succeeded in developing a software package which has a significant impact on the domestic market. Others include the works of Automation Task Force set up to provide free consulting to private and public enterprises, and experiments on new information technologies such as videotex and two-way cable television.
Projects are vigorously carried out, but the need for overall, coherent long term planning also become more and more urgent. As most of the projects, policies and plans are based on economic considerations, many began to worry about the social impact of what have already been accomplished and attempted. The feasibility study of two-way cable television and the experiment on videotex, for example, are primarily conducted by engineers. Issues of data bank, programming and regulation were not seriously considered until questions were raised and objections were heard within the government.

Output

Just like input, output of a communication system could be a number of things ranging from economic gains to superstars. From recent statistics, the effort of pushing for an information economy seems to be rewarding. Not only has economic growth been maintained, information products has become the largest exporting item. Until September 1984, the export value of information products has already reached US$470 million. Although there is no statistics available on the profit made by a better use of information, a study of 200 factories showed that automation has brought an average reduction of cost by 23.7%, a saving in manpower by 45.5%, and an increase of productivity by 1.5 times (China Times, Dec. 3, 1984, p. 2). The overall gain is higher than the average investment in automation facilities and personnel training.
Apart from economic gains, the growth of a modern information system integrating mass media, telecommunications media and computer seems to be moving--but at a rather slow pace. In fact, communication technologies have proved to be problematic in some cases. Audience's desire to have a greater choice of TV programs and their generally improved spending ability led to the rise of both video recorders and unlicensed cable networks in Taiwan. Although government limitation on the number of video recorders imported from Japan has just been lifted, the number of video recorders multiplied in recent years as domestically produced video recorders became available. Statistics showed that at least one-eighth of the TV families have a video recorder by the end of 1982 (Che, 1982, p. 23). The total volume of trade of video tapes reached US$30 million in 1982. Together with this booming business came the problem of copyright and control. But compared with problems brought by unlicensed cable networks, video recorders may not look so troublesome.

Beginning from the late 1970s when video recorders first appeared in the nation, some entrepreneurs had the idea of hooking up their video recorder with neighbors' television sets by cable and collect monthly fees for showing video tapes. Tapes shown were mostly pirated. The installation fee was around US$50.00, and monthly charge around US$10.00.

Since not many people could afford to buy video recorders, the business was soon thriving. At the peak of its growth in 1982-3, there were reportedly 200 to 300 such networks islandwide. Estimate of
number of subscribers range from 150,000 to 300,000.

Having violated the Telecommunications Law, Copyright Law and Broadcasting and Television Law* altogether, the government stayed a large-scale crack down on unlicensed cable operators in 1983. Up to the present, the number of operators may have gone down, but the problem has not disappeared.

*According to Telecommunications Law, only the Bureau of Telecommunications has the right to set up phone lines, cable networks, or any other signal transmission lines. Broadcasting and Television Law requires license for television broadcasting stations to operate.

With the coming of information age, data banks are becoming increasingly important. Unfortunately in Taiwan they too are plagued by problems of control and in addition, inadequate resources. At present there are very little information service around the country. The attention paid to data banks or software is not comparable to that in hardware systems. Just as there are problems with the transition into an information economy, the ways of handling records, attitude toward information sharing and present regulations may need to be changed before the hardware system can properly function.

Future Prospect
Like in many open systems, information revolution in Taiwan can be viewed as the result of close interaction among the need for continual economic growth, technological capability, government policy stands and market demand. There is little doubt that over past years, the communication-information system has expanded. There is little doubt too, that in terms of economic power and social structure, Taiwan has already had the necessary conditions for new communication technologies to survive. Aside from economic concerns, the question is, with new technological input into the system, whether it will develop in such a way to bring maximum benefit to the society in an information age.

In many ways, Taiwan is caught in-between: on the one hand, there is the urgent need in building an information system for economic reasons, on the other hand, the concern over cultural and media imperialism leads to limitations on the importation of cultural products and information materials, and political concerns brought constraints to open competition. Problems and contradictions thus derived from within the system.

Information revolution has brought Taiwan many happy returns. But further economic growth would need the support of an information society. And it is only reasonable to say that an information society cannot be realized on the basis of
strictly economic considerations. The shortest way for Taiwan, as for many other countries, is to go beyond economic considerations.
REFERENCE:


Cheng, J. C. "A Study of News Accuracy,"


Ganley, Oswald H. "Loosening the Telecommunication Link," Datamation, 26-9, September 1980, pp.149-152.


Information Industry Development Plan,


———. Republic of China's Development Plans of Information Industry (1980-1989), Taipei, Taiwan:


Table 1  Annual Growth Rate of Labor Productivity

<table>
<thead>
<tr>
<th></th>
<th>Whole Economy</th>
<th>Agriculture</th>
<th>Industry</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>1953-68</td>
<td>5.3</td>
<td>3.6</td>
<td>7.5</td>
<td>4.1</td>
</tr>
<tr>
<td>1968-78</td>
<td>5.6</td>
<td>4.2</td>
<td>4.3</td>
<td>4.5</td>
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</tbody>
</table>

Note: The data are three-year moving averages.

Table 2  Structure of Employment, 1952-1979

<table>
<thead>
<tr>
<th></th>
<th>Whole Economy</th>
<th>Agricultural Sector</th>
<th>Industrial Sector</th>
<th>Services Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1952</td>
<td>100.0</td>
<td>51.4</td>
<td>20.4</td>
<td>28.2</td>
</tr>
<tr>
<td>1961</td>
<td>100.0</td>
<td>46.2</td>
<td>22.4</td>
<td>31.4</td>
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<tr>
<td>1971</td>
<td>100.0</td>
<td>35.1</td>
<td>30.3</td>
<td>34.6</td>
</tr>
<tr>
<td>1982</td>
<td>100.0</td>
<td>19.0</td>
<td>41.0</td>
<td>40.0</td>
</tr>
<tr>
<td>Year</td>
<td>Primary</td>
<td>Secondary</td>
<td>Tertiary</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>----------</td>
<td>-----------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>1951</td>
<td>56.68</td>
<td>16.30</td>
<td>26.97</td>
<td></td>
</tr>
<tr>
<td>1957</td>
<td>52.30</td>
<td>18.95</td>
<td>28.74</td>
<td></td>
</tr>
<tr>
<td>1964</td>
<td>49.48</td>
<td>21.29</td>
<td>29.83</td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>36.73</td>
<td>27.91</td>
<td>35.35</td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>28.94</td>
<td>36.42</td>
<td>34.65</td>
<td></td>
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<tr>
<td>1978</td>
<td>24.93</td>
<td>39.28</td>
<td>35.74</td>
<td></td>
</tr>
<tr>
<td>1979</td>
<td>21.48</td>
<td>41.78</td>
<td>36.72</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>19.51</td>
<td>42.26</td>
<td>38.14</td>
<td></td>
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<tr>
<td>1981</td>
<td>18.84</td>
<td>42.17</td>
<td>38.98</td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>18.85</td>
<td>41.13</td>
<td>39.90</td>
<td></td>
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### Table 4 Distribution of Employed Workers by Occupation

<table>
<thead>
<tr>
<th>Year</th>
<th>Tech. &amp; Prof.</th>
<th>Admn. &amp; Exec.</th>
<th>Clerical</th>
<th>Sales</th>
<th>Service</th>
<th>Manuf.</th>
<th>Ag. &amp; Fishing</th>
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</thead>
<tbody>
<tr>
<td>1951</td>
<td>2.48</td>
<td>.28</td>
<td>5.70</td>
<td>10.33</td>
<td>6.26</td>
<td>18.80</td>
<td>56.07</td>
</tr>
<tr>
<td>1957</td>
<td>3.15</td>
<td>.34</td>
<td>6.75</td>
<td>9.44</td>
<td>6.56</td>
<td>21.77</td>
<td>51.75</td>
</tr>
<tr>
<td>1964</td>
<td>4.21</td>
<td>.38</td>
<td>7.65</td>
<td>8.88</td>
<td>6.40</td>
<td>23.56</td>
<td>48.93</td>
</tr>
<tr>
<td>1970</td>
<td>4.72</td>
<td>.39</td>
<td>9.70</td>
<td>11.54</td>
<td>7.29</td>
<td>29.78</td>
<td>36.56</td>
</tr>
<tr>
<td>1976</td>
<td>5.18</td>
<td>.85</td>
<td>10.90</td>
<td>11.73</td>
<td>5.82</td>
<td>36.92</td>
<td>28.59</td>
</tr>
<tr>
<td>1978</td>
<td>5.14</td>
<td>.88</td>
<td>11.35</td>
<td>11.66</td>
<td>6.79</td>
<td>39.52</td>
<td>24.64</td>
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<tr>
<td>1979</td>
<td>5.25</td>
<td>.87</td>
<td>11.78</td>
<td>12.08</td>
<td>6.93</td>
<td>41.89</td>
<td>21.22</td>
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<tr>
<td>1980</td>
<td>5.52</td>
<td>.89</td>
<td>12.95</td>
<td>12.43</td>
<td>7.09</td>
<td>41.85</td>
<td>19.24</td>
</tr>
<tr>
<td>1981</td>
<td>5.59</td>
<td>.87</td>
<td>13.32</td>
<td>12.88</td>
<td>7.46</td>
<td>41.26</td>
<td>18.60</td>
</tr>
<tr>
<td>1982</td>
<td>5.56</td>
<td>.78</td>
<td>13.61</td>
<td>13.04</td>
<td>7.69</td>
<td>40.62</td>
<td>18.57</td>
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Table 5 Social Indicators

<table>
<thead>
<tr>
<th></th>
<th>1952</th>
<th>1982</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LIFE EXPECTANCY AT BIRTH (Years)</strong></td>
<td>38.6</td>
<td>71.4</td>
</tr>
<tr>
<td></td>
<td>1952</td>
<td>1982</td>
</tr>
<tr>
<td><strong>DAILY PER CAPITA INTAKE OF CALORIES</strong></td>
<td>2,078</td>
<td>2,729</td>
</tr>
<tr>
<td></td>
<td>1952</td>
<td>1982</td>
</tr>
<tr>
<td><strong>DAILY PER CAPITA INTAKE OF PROTEIN (gm)</strong></td>
<td>49.0</td>
<td>75.3</td>
</tr>
<tr>
<td></td>
<td>1952</td>
<td>1982</td>
</tr>
<tr>
<td><strong>LIVING SPACE PER CAPITA (Sq. Ft.)</strong></td>
<td>75</td>
<td>188</td>
</tr>
<tr>
<td></td>
<td>1952</td>
<td>1982</td>
</tr>
<tr>
<td><strong>AUTOMOBILES PER 1,000 POPULATIONS</strong></td>
<td>1.0</td>
<td>50.8</td>
</tr>
<tr>
<td></td>
<td>1952</td>
<td>1982</td>
</tr>
<tr>
<td><strong>PERCENTAGE OF HOUSEHOLDS WITH ELECTRICITY</strong></td>
<td>45.2</td>
<td>99.7</td>
</tr>
<tr>
<td></td>
<td>1952</td>
<td>1982</td>
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</table>
Table 6  Computer Expenditure of 10 Nations

<table>
<thead>
<tr>
<th>Installation Fee (Billion U$)</th>
<th>Population (in Million)</th>
<th>Installation Fee Per Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>421 ('77)</td>
<td>216</td>
</tr>
<tr>
<td>W. Germany</td>
<td>73 ('77)</td>
<td>61</td>
</tr>
<tr>
<td>France</td>
<td>53.3 ('77)</td>
<td>53</td>
</tr>
<tr>
<td>U.K.</td>
<td>53.6 ('77)</td>
<td>56</td>
</tr>
<tr>
<td>Japan</td>
<td>92.6 ('77)</td>
<td>114</td>
</tr>
<tr>
<td>Singapore</td>
<td>.9 ('79)</td>
<td>2.3</td>
</tr>
<tr>
<td>Korea (S)</td>
<td>1.94</td>
<td>38</td>
</tr>
<tr>
<td>Philippines</td>
<td>.97</td>
<td>45</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>1.63</td>
<td>5</td>
</tr>
<tr>
<td>Taiwan</td>
<td>1.05</td>
<td>17</td>
</tr>
<tr>
<td>World Average</td>
<td>983 ('77)</td>
<td>4120</td>
</tr>
</tbody>
</table>
Table 7  
Number of Automation Specialists  
Per One Hundred Factories

<table>
<thead>
<tr>
<th></th>
<th>1981</th>
<th>1983</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machinery</td>
<td>14</td>
<td>68</td>
</tr>
<tr>
<td>Electronics</td>
<td>27</td>
<td>171</td>
</tr>
<tr>
<td>Plastics</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>Textile</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Food Processing</td>
<td>--</td>
<td>24</td>
</tr>
</tbody>
</table>
Table 8  Media Spread in Eleven Nations

<table>
<thead>
<tr>
<th></th>
<th>Newspaper (per 1,000)</th>
<th>Radio (per 1,000)</th>
<th>Television (per 1,000)</th>
<th>Telephone (per 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>282 ('79)</td>
<td>2040 ('79)</td>
<td>635 ('79)</td>
<td>78.8 ('79)</td>
</tr>
<tr>
<td>U.K.</td>
<td>441 ('81)</td>
<td>931 ('79)</td>
<td>394 ('79)</td>
<td>47.7 ('79)</td>
</tr>
<tr>
<td>Canada</td>
<td>241 ('79)</td>
<td>1104 ('79)</td>
<td>466 ('79)</td>
<td>68.6 ('79)</td>
</tr>
<tr>
<td>Japan</td>
<td>569 ('79)</td>
<td>777 ('79)</td>
<td>245 ('79)</td>
<td>46.0 ('79)</td>
</tr>
<tr>
<td>Australia</td>
<td>336 ('79)</td>
<td>1039 ('78)</td>
<td>383 ('79)</td>
<td>48.9 ('79)</td>
</tr>
<tr>
<td>Italy</td>
<td>97 ('78)</td>
<td>240 ('79)</td>
<td>231 ('79)</td>
<td>33.7 ('79)</td>
</tr>
<tr>
<td>Taiwan</td>
<td>181 ('81)</td>
<td>500 ('81)</td>
<td>189 ('80)</td>
<td>24.8 ('83)</td>
</tr>
<tr>
<td>Singapore</td>
<td>249 ('79)</td>
<td>179 ('79)</td>
<td>212 ('79)</td>
<td>29.1 ('79)</td>
</tr>
<tr>
<td>Korea</td>
<td>136 ('70)</td>
<td>402 ('78)</td>
<td>151 ('79)</td>
<td>7.7 ('78)</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>---</td>
<td>516 ('79)</td>
<td>213 ('79)</td>
<td>32.6 ('79)</td>
</tr>
<tr>
<td>Brazil</td>
<td>44 ('78)</td>
<td>295 ('79)</td>
<td>126 ('79)</td>
<td>6.3 ('79)</td>
</tr>
</tbody>
</table>
Figure 1  Unemployment Rate, 1953-1979

Note: The rapid increase in 1978 is mostly due to a change in sampling and statistical methods, which are subject to a further revision.
Figure 2  Percentage of GDP by Sectors

*Services Include Government, Transportation, Commerce, Banking, and All Other Tertiary Industry Activities.
Figure 3  Gap Between Wage and Productivity

Accumulated Growth (%)

Wage
Productivity

Note: 1973 as a basis of calculation.