38. Hart to Campbell, 17 December 1905, in *Hart*, vol.2, doc. 1392.

39. It is alleged in Lo, *Morrison*, vol.2, p.25 that Brown as a close friend of Morrison was recommended by the latter as Counsellor to the Chinese Legation in London. This is confirmed in Jordan to Campbell, 28 January 1908, in FO 8--/244. There are various references to the effect that Brown returned to Korea; but I have found no evidence of this.

THE QUALITY PUZZLE: HOW HAS KOREAN INDUSTRY MASTERED TECHNOLOGY SO FAST?

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This paper asks why south Korea has managed to produce export quality manufactures so much more effectively than other developing nations. It argues that the interaction between a hostile external environment and a cohesive, ambitious internal community forced the pace of development beyond that achievable under less intense conditions. Few other countries—including Korea in the coming years—will be able to replicate such conditions.

The Economic Backdrop to Korea's Quality Miracle

Corporations face an economic balance which has shifted from solving the problems of shortage to solving the problems of glut. The period of post-war reconstruction laid stress on production, with associated anxieties about lack of food, minerals and manufactures. The 1970s oil shocks extended this "shortage mentality". But the early 1980s recession revealed a completely changed economic landscape. World prices of traded commodities (grain, oil, minerals) fell dramatically and competition in all spheres of economic activity increased sharply. So now corporate

priorities are focused closely on competitiveness, or put more simply "meeting customer needs". The age of the engineer has given way to the age of the marketeer.

At the heart of south Korea's remarkable economic advance has been the ability to deliver high-quality manufactured products in a wide variety of industries. It is now the world's twelfth biggest exporter. This has been achieved by marshalling international flows of capital and technology, combining them with indigenous, highly committed factors of production, and satisfying customers in a global market place. Table 1 describes this international position. Note that south Korea's "true" ranking in the "Exporters' League Table" should be tenth, since much of the value of exports from Hong Kong and the European Benelux countries is entrepot trade.

Table 1: The World's Top Fifteen Exporters (1)

Rank	Country	Exports (2)
1.	West Germany	293,790
2.	USA	250,405
3.	Japan	231,286
4.	Benelux (3)	175,445
5.	France	148,382
6.	United Kingdom	130,868
7.	Italy	116,086
8.	USSR (4)	97,336
9.	Canada	97,082
10.	Taiwan	52,632
11.	Hong Kong	48,475
12.	**South Korea**	**47,282**
13.	Switzerland	45,515
14.	Sweden	44,518
15.	PR China	39,542

Notes: (1) The above 15 territories account for 71.5% of total world exports. (2) US$ million; 1987; f.o.b.; visible exports (ie tangible products—commodities, components, and manufactures—but excluding so called "invisible" services such as transport, tourism, banking, insurance, interest, dividends and earnings). (3) Belgium, Netherlands and Luxembourg, containing a high proportion of entrepot trade. (4) 1986 figure.

Table 2: Exports from Asia

Rank	Country	Exports (1)	Populations (2)
1.	Japan	231.3	122.1
2.	Taiwan	52.6	19.4
3.	Hong Kong	48.5	5.6
4.	**South Korea**	**47.3**	**42.1**
5.	PR China	39.5	1053.2
6.	Singapore	28.7	2.6
7.	Malaysia	17.9	16.6
8.	Indonesia	14.8	170.5
9.	Thailand	11.7	53.6
10.	India	11.3	781.4
11.	Philippines	5.6	57.4
12.	Pakistan	4.2	102.2
13.	Sri Lanka	1.4	16.3
14.	Papua New Guinea	1.1	3.5
15.	Bangladesh	0.9	102.6

Notes: (1) US$ billion; 1987; f.o.b.; visible exports. (2) Million.
Source: The Economist Group

What is Total Quality Management?

Total Quality Management is a management philosophy which describes techniques to ensure customer orientation. The word "Quality" is here defined as "conformity to agreed customer requirements". Note that this does not mean that quality products are expensive ones—rather that they meet needs at an acceptable price. A Citroen 2CV car is a quality product since it meets the needs of a large number of customers at a modest price—whilst the DeLorean sports car was not a quality product—despite its technological prowess, few people were prepared to buy it. (Examples of British companies who have staged impressive recoveries by embracing Total Quality management techniques include British Airways, Rank Xerox and the computer maker ICL).

The Engines of Korea's Economic Advance

Contrary to popular belief low labour costs have not been the principal reason why south Korea has become such a significant force in textiles, steel, shipbuilding, cars, consumer electronics, semiconductors, construction and other sectors. Rather, a combination of capital intensive manufacturing plants, a highly educated and flexible workforce and a crucial sense of national commitment have ensured south Korea has succeeded in delivering export quality.

How did south Korea achieve this feat, when so many other developing countries have manifestly failed to do so? This paper picks out some of the most crucial factors, but it is important to stress that it has been the interplay of these factors which has produced Korea's extraordinary rate and type of advance. Most countries in Asia, even the most impoverished, share certain of these attributes: Korea's success has relied on putting them all together.

External Factors

i. *Trade*

The Koreans are not intrinsically traders, and very, very reluctantly accept the capitalist world trading system. As one senior Samsung executive put it, "By the mid-1990s we will be a responsible member of the world economic clubs (GATT, OECD & C) not because we want to, but because we have to".

Following the Korean War south Korea had no significant industrial base or mineral resources (both were

in north Korea) and an impoverished domestic market. Total output (GNP) in 1953 was just $1.4 bn (at current prices): a subsistence economy. Producing products of export quality was (and to a large extent remains) the only available engine of expansion. Visible exports now account for 37% of GNP, compared to 14% in Japan and 22% in the UK. This reliance on exports has forced the Korean manufacturing industry (but not other sectors such as farming or non-tradeable services) to build to international quality standards.

ii. *Japan*

Japan has been a crucial "tutor" to south Korea. Much of the south Korean success in terms of management style, production engineering and technology transfer is due to successful mimicking of Japanese methods.

Since 1961 55% of the technology transfers to Korea have been from Japan. Many of the older business leaders retain strong connections with their Japanese counterparts and—especially in light of the recent yen appreciation—Japanese companies have invested heavily ($1.5 bn in the last five years) in Korean industry. However, the role of Japan goes back much further. Indeed, in retrospect, the 1876 treaty that Japan forced on Korea marked a pivotal point in Korea's industrial development. It was the end of Korea's connection to a decaying Chinese economy, an economy stagnating in corruption and undynamic in technology, and the beginning of a liaison with East Asia's new industrial powerhouse.

Clearly, until 1945 this relationship was a brutally imperialistic one, with Japanese industrial interests using Korea as a convenient colonial adjunct. Even so, and even as occupiers, Japanese did invest in Korea to ensure it

remained a viable prop to their ambitions. Especially after 1910, the Korean people were learning the techniques of industrial power. Formal education was widely expanded, workers were trained in factory discipline, and industrial development displaced dependence on agriculture. By 1938 Korea had 200,000 industrial workers. The result was that, though the physical infrastructure was totally devastated in 1953, the people in south Korea were unusually receptive to new industrial development. Also, the residue of enmity left by the Japanese provided a painful grain to fatten Korea's industrial oyster.

iii. *The USA*

The USA contributed much by rebuilding the national infrastructure during the 1950s and 1960s, through training skilled technocrats, and by providing management skills. Direct aid between 1953 and 1970 amounted to $6 bn in concessionary aid and $7 billion in military aid, and during the 1950s accounted for 75% of gross investment. In short, the US gave Korea a brand new national infrastructure in the 1950s and US-trained technocrats master-minded the astute economic management of the next two decades.

Equally important, the US has provided the demand to amortise investments in Korea's ambitious, and highly risky, development process. Direct demand for munitions and other products during the Vietnam war boosted Korean industry in the 1960s, while more recently domestic US demand for Korean steel, cassette recorders, cars and many other consumer goods has sustained it. It is important to note that without the assurance of this large US market, Korea's export-oriented, industry-led expansion would almost certainly have suffered the same fate as that of many other developing countries, who invested in "White Elephant" industrial projects that went bankrupt.

iv. *Threat*

The constant threat of war still today keeps the country in a state of anxious readiness, and focuses minds on the job in hand. Life is serious, economic achievement is a surrogate form of national assertion and—on economic issues—there is much sense of common purpose. In terms of promoting quality this has several direct effects: military requirements forced engineers in aerospace, electronics and the auto industries to build to high specifications. But the ancilliary benefits in the wider industrial community are probably more important. For the Republic of Korea, economic achievement is equated with national achievement and both are seen as essential supports for overall security. The economic engine is viewed as part of a common national heritage to be nurtured by all players in the industrial scene. Even during the spate of strikes in the summer of 1987, when workers were demanding more money and better conditions, few were asking for reduced working hours.

Internal Factors

i. *People*

The most distinctive internal factor explaining Korea's excellent quality performance is the characteristics of the people. The general level of education is very high, with literacy levels exceeding those in the USA or the UK for instance, and learning is held in high esteem. The workers are very eager to innovate, have an acute inquisitiveness, and are interested in upgrading work practices.

Undoubtedly Korean workers do work very hard—the average work week has increased from 50 hours in 1975 to

54 hours today—but it is wrong to characterise them as docile drones. On the contrary they are eager, motivated and on occasion, rebellious. As one American who has worked with Korean entrepreneurs for 20 years put it: "They are instant experts infected with the 'Can-Do' syndrome". This attitude is evident throughout the Korean corporations. At the shopfloor level the much-publicised Japanese ethic of continuous improvement is at work (for reasons see under "Education" below); at middle management level the pace of change has been so rapid that there are plenty of opportunities for bright young managers; at the senior level prodigious entrepreneurs like Hyundai's Chung Ju-young [Chŏng Chuyŏng], Samsung's Lee Byung Chull [Yi Pyŏngch'ŏl] or Daewoo's Kim Woo-Choong [Kim Ujung] have been given scope to live out their grandiose dreams.

In Korea, the notion that ambitions should be just beyond your capabilities is taken to extremes. In industry after industry senior managers have set targets that were believed to be widely optimistic by "experts". This extravagant ambition has forced the pace of advance in Korea in a way quite inconceivable in actions used to steady advance and the quiet contemplation of alternatives. As a footnote it should be added that such ambitions have frequently unravelled, exposing Korea's *chaebŏl*—and the nation itself—to awesome risks. And many observers note that this ability to "pick winners" will prove increasingly difficult in future.

ii. *Education*

The contribution of broad, comprehensive education across the whole population remains one of Korea's most potent economic attributes. Confucian respect for learning underpins an educational infrastructure that puts that of many much richer countries to shame.

Although now ignored, the colonial Japanese laid impressive foundations—increasing the primary school enrolment from 20,000 in 1919 to 900,000 in 1937 on one estimate. The Republic of Korea has subsequently devoted massive sums to education. In 1961, education was made compulsory to age 14—an extraordinarily enlightened decision for such an impoverished country—and it has since been extended to age 18. 1.2 million students are in Tertiary education—and 40% of graduates are in science and engineering. Although some educationalists question the quality of the teaching methods, the sheer bulk of learning going on is awesome to observers from America and Europe—final year students at Kyŏnggi High School in Seoul are expected to put in 4-5 hours homework per night, and much more in advance of examinations.

The results of all this in industrial terms is that employees in Korea are rapidly able to master new technology. On the auto production lines, for instance, assembly workers are the Aristocracy of Labour—as they were in Henry Ford's Detroit. As one manufacturing manager put it to me:

> In America or Europe we staff our car plants with the dregs—people who can't find a job anywhere else. Here [in Korea] these guys really want to be here, building cars.

It is debatable how long such highly educated workers—especially the young women who staff the dullest assembly lines—will be prepared to put up with such jobs. Equally, as Korean living standards rise, workers in Ulsan or Seoul will no longer receive such low wages compared to rivals elsewhere in the world. But it is clear that the high educational quality of the Korean workforce is a crucial dynamic in perpetuating the quality miracle.

iii. *Investment*

This high quality labour force has also been given the tools to do the job. Korean industrialists, greatly assisted by an (economically) benevolent autocratic state to marshall resources, have invested very heavily in high risk projects to acquire technology, build high-technology factories and provide south Korea with a thoroughly up-to-date industrial fabric.

Throughout Korea's rapid expansion the society as a whole has ensured that massive investment requirements have been met. A thrifty population has saved prodigiously, so that savings—and hence investment—have been well over 30% of total income each year. Money has not been allocated to consumption, still viewed as frivolous to many Koreans. The imperative has been to save, to secure the future in a personal and, hence, a national sense. However, even such high savings rates did not quench the thirst of Korean industry for investment funds in the late 1970s and early 1980s. Korean industrialists, dreaming apparently impossible dreams, were demanding massive investments in highly capital-intensive steel-mills, shipyards, chemical complexes and auto plants. The state turned abroad for the funds and, effectively, banked the nation on fulfilling those impossible dreams. The gamble almost bankrupted the state in 1980, and debts continued to spiral to levels proportionately much higher than those in Latin America. In 1985 external debt totalled nearly $50 billion.

This highly dangerous policy, which would be condemned as grotesquely irresponsible if done by most other developing countries, worked. South Korea has consistently (on average) earned a rate of return greater than the cost of capital, and hence the debt has never become unmanageable. The result is that across the whole range of economic activity Korean industry uses

high-grade equipment. There is an interesting footnote, however. Since 1985, the Koreans have been using their current account surpluses to retire debt at as fast a rate as possible. Although there are still plenty of capital-hungry projects that the nation could invest in, its leaders have decided that national pride demands that Korea should not be a debtor nation. In strict economic terms this may be unwise; but national pride is ultimately much more important than economics.

iv. *Technology acquisition*

The Korean attitude to technology is comparable to that for raw materials or capital: "if you haven't got it, go out into the world and find it". Moreover, once found—whether begged, borrowed, bought or stolen—technology is put to work at speed.

Samsung's entry to the world semiconductor market illustrates this clearly. The company decided to enter this highly competitive, very cyclical business, in the early 1980s. It acquired a technology license from Micron Technology (and also ended up compensating another company, Texas Instruments, for alleged patent infringement), built a fabrication plant in six months—under half the industry norm—and produced 7 million wafers in the first year, against a forecast of 2 million. There was much doubt among industry specialists that Korea would be capable of advancing so fast in a field that is on the very limits of electronics technology. Yet Korean companies—led by Samsung, but now joined by Hyundai and Goldstar—invested a total of US$ 1,200 million between 1983 and 1987 in semiconductor manufacturing, and have now won over 10% of the world market for memory chips.

More remarkable than this feat of investment is the pace of technology assimilation. The Korean companies

produced their first volume memory chip in 1984. It was a 64K DRAM, a device capable of storing 64,000 pieces of information in easily retrievable form on a piece of silicon the size of a thumbnail. At that stage Samsung was about 3 years behind its American and Japanese rivals. In 1990 Samsung plans to introduce a 4 megabite DRAM—capable of storing 4,000,000 pieces of information on a thumbnail-sized silicon sliver—at roughly the same time as its competitors. This example, replicated in many less advanced sectors (high technology sports shoe manufacture by Reebok, steel manufacture by POSCO, car making by Hyundai and so forth), shows how Korean companies have been able to climb the "technology ladder" with extraordinary speed.

Can this Continue?

The question most often asked by Western industrialists observing Korea's manifold achievements is: where will this end?

The answer is that it won't, although the implications are not as troublesome as many often fear. Korea is not another Japan; its overall size, technology level, and the strength of industrial fabric are all very weak by comparison. Moreover its achievements have been focused on certain leading sectors, leaving large parts of the Korean economy largely untouched by the modern, quality-conscious world. And, although there is still plenty of steam left in the Korean industrial engine, its speed of advance is likely to slow. Some key danger-points are:

1) Trade: South Korea is unusually exposed to a competitive global trading environment. Any protectionism, especially in the USA, could easily destabilize its ambitious development plans.

2) Democracy has its cost. Korea's benevolent autocracy enabled that condition so beloved of international investors: stability. In the long run, Korea's quality miracle demands greater participation and involvement by its employees, but in the short run labour unrest and dissent will almost certainly unsettle it.

3) Innovation is still novel to Korea. So far Korea's giant *chaebŏl* have introduced no new product concept (such as a microwave oven, front-wheel drive car or video cassette recorder) to the world; they have always been diligent imitators. Thoughtful companies are investing in this problem, but paradigm-transforming innovations demand more than money.

4) Financial sophistication is still extremely rare. Korea has many bankers who cannot realistically judge a loan-risk, stockbrokers who have never been exposed to genuine down-side risk and industrialists whose investment decisions have always been underwritten by the state. On a simple level this is already costing the *chaebŏl* heavily by, for instance, lack of access to instruments like currency hedging; at a deeper level, the society is unable to assess options on a sound financial basis.