

Garage Factories Growing Into Global Corporations
-Key Success Factors of Japanese SMEs-

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I: Introduction.

Economic growth in any country has been closely associated with the rise and fall of entrepreneurs. History of economic growth in Japan is full of episodes explaining the rise and fall of entrepreneurs. In the early phase of economic growth, a group of entrepreneurs were conglomerated into the “ Zaibatsu “ of Mitsubishi, Mitsui, Sumitomo etc . They played important roles for the development, particularly, of heavy and chemical industries whose huge capital investment requirements were mostly financed by their own banks. The Mitsubishi Zaibatsu was founded by the Iwasaki family which came from the lower Samurai class. The Mitsui group was founded by the merchant family whose history was dated back in Tokugawa period. These Zaibatsu groups can be properly called “ crony capitalists” directly and indirectly supported by the governments who accumulated their wealth benefiting from the governments’ protection policies and also from the collusions with them.

On the other hand textile industries, which had accounted for a large of portion of Japan’s exports before the war, were undertaken primarily by the small and medium scaled enterprises, some of them had later grown into large corporations.

In the latter half of her industrial growth in the pre-war period of Japan, a group of corporations not belonging to the Zaibatsu had emerged acting as the new driving force of the industrialization in Japan. These rising corporate groups included Toyota, Nissan etc. In the post-war period, a newer group of entrepreneurs appeared and have quickly grown contributing to the accelerated economic growth. These newer types of well known corporate groups are Matsushita, Sony, Honda and others. Mr. K. Matsushita, a founder of the Matsushita corporations, was started his business as an owner of bicycle repair shop. Mr. S. Honda was one of many small manufacturers of motor bicycles in the 1950s. Sony was started as a small assembling plant of electric appliances which was established by Mr. Morita , Mr. Ibuka and other entrepreneurs.

A life blood of economic system in Japan was the creative energies of these entrepreneurs, most of them started as SMEs. Their dynamism was the driving force which vitalized the Japanese economy. Many of these entrepreneurs entered into potentially high growth industries have grown as the global corporations. However, many other entrepreneurs have miserably failed the test of competitive markets and were driven out from the economic system of Japan. There have been as

many human dramas of successes and failures as the number of enterprises have appeared and disappeared in the past.

In Japan there presently exists some 5 million enterprises. We witness the emergence of a new and rising wave of the entrepreneurs whose creative energies were unleashed by the great business opportunities created by the information technology. Professor Lester Thurow of MIT and many other people believe that we now enter a new age of the third industrial revolution in which an entrepreneur of the Silicon Valley type becomes a new cultural hero. E-business and e-commerce create enormous business opportunities for the innovative and risk-taking entrepreneurs. In the following let us briefly look at some of the key factors of why some entrepreneurs were able to succeed in the past from which we might be able to learn lessons as to why some entrepreneurs succeeded while others failed.

II: DISCO Corporation; A Garage Venture Growing Into A Global Business

1. Dynamic Growth of DISCO

In Japan a small and medium scale enterprise(SME) is now defined as the one which employs less than 300 workers or the one whose equity capital less than ¥ 100 million(but for the trade businesses a different definition is used). Presently some 5.1 million enterprises or over 99 per cent of the total enterprises operating in Japan are classified as the SME and some 29 thousand companies are defined as the large corporations. The Ota District of Metropolitan City of Tokyo has become one of the major centers of SMEs in Japan where a large cluster of SMEs have developed so as to form a complex of industrial linkages of part and components manufacturing, a network of several layers of sub-contracting and contractual relations for OEM manufacturing, and a network of interdependency of businesses in a variety of manufacturing sectors.

Many of SMEs were started as the family owned small businesses employing only several workers and have grown into the high technology oriented global enterprises. One of such a SME is DISCO Corporation which has a headquarters office in the Ota District. When Mr. Kenichi Sekia, Chairman, President and CEO of DISCO Corporation, graduating from Keio University majoring in economics, joined his father's company called Daiichi Seitosho Company from which the present name of DISCO comes from, father's company had a small factory in Kure city, Hiroshima Prefecture employing less than one hundred workers producing a variety of grinding stones being

used by the Kure Navy Shipyards smoothing the surfaces of cannons and other parts of ships. His father's company was founded in 1937 as one of many SMEs in Kure manufacturing a variety of parts and components for the shipyards. His father decided in 1940 to move the headquarters office into Tokyo to expand the markets for grinding stones business. After the war the Company succeeded in developing a series of new products of precision cutting grinding stones and blades. First, they developed 1.2 mm grinding stones being used by the housing industries to produce meters to measure the materials. Then they developed a precision cutting grinding stones which can cut metals into thin pieces of 0.13-0.14 mm which was being used by the manufacturers of fountain pens to slice the nibs in 1956. The Company had gradually become specialized in producing a variety of the precision cutters which are produced by pressing powders of diamond mixed with other materials under high temperature.

A turning point came in 1968 when they developed a new precision cutter of 30-40 microns thin which can slice any materials into extremely thin pieces (one micron is a one thousandth of 1.0 mm). This new product development was driven by the insatiable passion or maniac quest of Mr. Shinji Seki, a younger brother of Kenichi Seki, to cut everything in his sight into very thin pieces and to reach the technical limit to develop a "micron cutter." However, they faced the problem of no equipment manufacturers in Japan capable of producing such an electro-mechanical equipment to mount a "micron cutter." So they decided to produce a prototype of such electro-mechanical equipment by themselves. They rented a small garage in the Ota District and started by trial and error to produce the precision cutter equipment by assembling parts and components purchased from a number of the manufacturers of precision equipment in Ota District and elsewhere. Their works were assisted only by two young workers who had no engineering background. It took them some seven years to develop a prototype of "micron cutter."

Semi-conductor industries quickly grew in the 1970s onwards producing ever smaller silicon chips which are mounted on wafer cut into minute sizes, DISCO's products of "microns cutter" became instantaneous success after the prototype was displayed at the trade show of semiconductor equipment manufacturing industries in USA. Since then DISCO developed a series of new high precision cutters which was in great demand by the semi-conductor and electronic components industries.

DISCO experienced six challenges or turning points in its past growth process; the first challenge

was in 1968 when DISCO shifted to the manufacturer of “micron cutter” from the manufacturer of traditional grinding stones. The second challenge was in 1975 when it entered the phase of “electro-mechanics.” The third challenge was in 1979 when it started overseas operations. The fourth challenge was in 1984 when it modernized a management system of the company. The fifth challenge was to restructure itself in coping with the economic recession in 1992 and the recent challenge was the attempt to create a new corporate culture starting in 1997.

2. Accomplishments of DISCO

In the year 2000 DISCO approximately accounts for 90 percent of domestic market and 80 percent of worldwide for the mainstay dicing saws business. DISCO holds now a dominant position in the semi-conductor equipment manufacturers in Japan. DISCO’s garage entrepreneurial venture has grown into a global business in a very short time span of some thirty years. DISCO’s financial and operational performance in the year 2000 and her remarkable growth records are summarized below;

Net sales	\$ 484 million
Operating income	\$ 103 million
Net income	\$ 46 million
Total assets	\$ 633 million
Return on equity	14.3 percent
Global operations	30 overseas subsidiaries and sales agencies in 12 countries
Markets	Japan 43.4 % ;Asia 33.9%; Europe 11.6%; North America 11.2%
Shareholders’ Equity	\$ 385 million
Size of staff and employees	1700
Growth of DISCO (1960-2000)	
Shareholder’s Equity	5,428 times
Net sales	508 times
Net income	3,200 times
Assets	586 times

Employees

8.1 times

DISCO's main products are dicing saws, grinders, and other precision systems which are being used to process silicon wafers into semiconductors which are used in a variety of products such as mobile phones, PCs, digital cameras, DVD players and video-game consoles. DISCO's products are now used by the major producers of semiconductors and electronic appliances in Japan as well as by the main overseas producers such as Acer, Ericsson, Hewlett-Packard, Hyundai, IBM, Intel, Kodak, Motorola, Nokia, Philips, Rockwell, Samsung, Siemens, Texas Instruments etc. DISCO has attained a leading position in the precision systems products and electronic components. It developed advanced technologies of "kiru (cutting)," "kezuru (grinding)" and "migaku (polishing)" processes. In 1974 DISCO was asked by the Japanese research institute to cut the rocks brought back to the earth by the Apollo Mission.

DISCO was awarded various prizes more than 15 times since 1969 by the former Ministry of International Trade and Industry(MITI), Ministry of Education and Technology and a number of newspapers and associations for the recognition of DISCO's new products developments, pursuit of excellence as an entrepreneurial venture and advancements of technologies.

DISCO's stocks were listed at the OTC market in 1989 which were actively traded as the high growth stock. DISCO was listed on the First Section of the Tokyo Stock Exchange on December 7,1999.

3. Key Success Factors of DISCO

(1) Entrepreneurial Passion to Perfect the Technologies

The SEKI brothers were obsessed by their almost maniac desire to perfect the cutting, grinding and polishing technologies inherited from their father's company. They developed a series of cutting edge technologies of precision processing of ceramics, glass and metal.

(2) New Products Developments in High-Growth Industries of Semiconductors and Electronic Components

The Chip Size Package(CSP) has become a dominant semiconductor package design for mobile phones and notebook PCs. In the CSP fabrication process, the role of the precision cutting process has increased substantially, resulting in a sharp rise in demand for DISCO's cutting equipment and precision diamond wheels. DISCO also benefited from the trend toward

miniaturization in IT industry, digital home electronics, mobile phones, Internet which all requires the precision processing technology. Global market of semiconductor equipment industry has very rapidly expanded from \$ 8.0 billion in 1988 to \$48.0 billion in 2000 with an average growth rate of 16.0 percent per annum. Market shares of semiconductor equipment manufacturers by the country in 2000 were North America 26.5 %, Chinese Taipei 20.3 %, Japan 19.4 %, Europe 13.3 %, Korea 7.9 %. Japan's market share has gradually declined due to the expansion of OEN manufacturing in Chinese Taipei and Korea in the 1990s. In 1990 Japan had the largest market share of 44.4%, followed by North America 34.2%, Korea and Chinese Taipei 10.3% and Europe 11.1%

(3) Agglomeration or Cluster Effects of the Ota District

In Ota District of Tokyo there are a large number of SMEs operating in variety of industrial sectors with which DISCO could easily develop sub-contracting relations to produce a variety of electro-mechanic devices particularly for the purpose of manufacturing the prototypes of new products. This was not possible elsewhere in Japan.

(4) Outsourcing Strategy

DISCO has decided to concentrate upon the core competent areas of cutting, grinding and polishing for the advancement of technologies and outsourced the manufacturing of most of electro-mechanic devices and components. By so doing DISCO was able to reduce the overhead costs of R&D investments and manpower costs. Presently some 60 percent of DISCO's manpower is non-regular staff or employees ; they are either part-time or contractual workers. DISCO fully utilizes the networks of human and technological resources available in the Ota District.

(5) Entrepreneurial Spirits of Family-Owned Business Style

DISCO has retained the management style of a family-owned business in which the management can keep close touch with the staff and employees and succeeded in forming a community type of corporate organization. As a result organizational resources can be effectively mobilized to achieve corporate missions set by the management. DISCO is now a medium sized company; neither too large nor too small.

(6) Application-Oriented Technologies

Instead of relying on the new product developments resulting from R&D investments, DISCO

has tried to develop new products to meet with the specific requirements of how DISCO's equipment and devices are applied by the industrial users. As a result DISCO was able to keep abreast with the technological trends and needs of industrial users. DISCO's products are individually assembled according to the specifications provided by each industrial user.

(7) DISCO's Competitive Advantages

DISCO is the only company in Japan as well as in the world which has developed its own technologies of dicing saws and equipment. Other companies manufacture only grinding stones or electro-mechanic equipment and device alone. As a result, DISCO was able to technologically excel in the technologies of dicing saws equipment.

(8) A Niche Marketing Strategy

DISCO operates in niche markets in which it holds a large market share, particularly in dicing saws equipment market, in which large manufacturers of industrial equipment may find it difficult to enter, no matter how advanced their technologies are.

(9) Global Network of Sales and Services

DISCO established its own network of overseas marketing and technical services after sales from the very beginning of its overseas operations. It was critical for DISCO to establish the reliability and credibility of DISCO as the precision equipment manufacturer.

(10) Weakness Turned Into Strength

DISCO first entered into a low technology business of manufacturing the grinding stones in local market of Kure city in Hiroshima Prefecture. The founder of DISCO was educated in China and became a civil servant with no technical educations. He started his business of manufacturing grinding stones in his home town with no technical skills and little capital. The market was already over-crowded so that he has no choice but to enter a niche market with little capital and technical resources, i.e., to manufacture special type of grinding stones which can be fired by the smaller kiln requiring less capital investment and will be used to slice or cut the materials into small pieces. The technologies of dicing the materials into ever smaller pieces became the hallmark of DISCO.

III: Murata Manufacturing Co (MMC), Ltd. From A Family Potter to Global Industrial Ceramic Business

1. Dynamic Growth of MMC

Akira MURATA was born in 1922 in Kyoto, one of the old cities in Japan where his father had a small family owned business of pottery producing a variety of porcelains for the use of domestic households and souvenirs for the visitors to Kyoto. In his childhood, he was afflicted with a series of diseases and he was often stricken to bed not being able to finish his high-school education. When he joined the family business to assist his father, its workshop employed only a couple of female workers.

Akira Murata wanted to expand his father's business by aggressively marketing the porcelains but he was admonished by his father saying ; "our gain would be the loss for other porcelain makers of such a small business community in Kyoto City." Akira therefore decided to go into an industrial ceramics in which he did not have to compete with other porcelain makers. In 1941 when Akira turned twenty, his father passed away due to stomach cancer.

By trials and errors Akira succeeded in 1945 producing titanium-dioxide capacitors, commonly known as "Ceracon," which was sold to Mitsubishi Electric Company. In 1946 Akira became acquainted with Mr. Tetsuro Tanaka then Associate Professor, Electric Engineering Department, Kyoto University. This marked the beginning of a long collaborative relation between them. Prof. Tanaka's laboratory was with low budget short of research funds to carry out necessary experiments whereas Mr. Akira Mura was in dearth of the professional advices and suggestions as to what kinds of industrial ceramics he should produce. Akira started to carry out a variety of tests to examine the physical, chemical and electrical properties of ceramics and other raw materials as suggested by Prof. Tanaka. Some of the students of Professor Tanaka's laboratory later joined Murata Manufacturing Company (MMC) after their graduation from Kyoto University due to the lack of employment opportunities elsewhere.

As a result of these collaborative activities, Murata Manufacturing Company (MMC) succeeded in developing a variety of industrial ceramics which are to be used later as the electronic components for telecommunication equipment, computers, word processors, photocopiers. TVs, CD/DVD Players, air conditioners. As Japan's economy grew rapidly from the 1950s onwards,

market demand has rapidly expanded for kitchen equipment, health equipment, car navigation system and other industrial and consumer electronic equipments, all of which required the use of industrial ceramics. The first success of MMC was the new product development of barium titanate; the “ wonder stones “ for electronic ceramics. MMC’s products have become diversified in meeting with the market demands and their production volume exponentially expanded rapidly. As a result, the production capacity of MMC has increased continuously within several decades. MMC started overseas operations from the 1960s.

2. Accomplishments of MMC

MMC’s financial and operational performance in the year 2000 and also the past growth records are summarized below:

Net sales : \$ 4,331 million(North and South America 18.1%;Europe 20.5%;
Asia and others 27.9% and Japan 33.5%)

Sales by application; consumer electronic components16.6%; industrial electronics
components 61.2% and home electronics components 22.2%

Net income : \$ 581.4 million

Total assets : \$ 7,125 million

Shareholders’ equity : \$ 5,522 million

Number of subsidiaries : 49 (24 in Japan and 25 overseas)

Number of employees : 25,427 of which 4,700 are for a parent company

Growth of sales : 1951-1961: 78.9 times 54.8 % per annum
1961-1971: 6.7 times 21.0 %
1971-1981: 8.0 times 23.1 %
1981-1991: 2.9 times 11.2 %
1991-2000: 1.6 times 5.4 %
1951-2000: 19,961 times 22.4 % per annum

Growth of sales value 1951 : ¥ 23 million- ¥ 1,814 million
1961: ¥1,814 million
1971 : ¥ 12,141 million
1981: ¥ 96,931 million

	1991:	¥280,467 million
	2000:	¥459,125 million
Size of employees	1951:	112
	1961:	2,365
	1971:	4,404
	1981:	9,282
	1991:	21,993
	2000:	25,427

Listing of MMC's Stocks : 2nd Section of Osaka Stock Exchange in March 1963

First Section of Tokyo and Osaka Stock Exchange

In February 1970

3. Key Success Factors of MMC

(1) Close Collaborations with Professors of Kyoto University

As Akira Murata had received no educations in the science and technologies of industrial ceramics, he was very eager to seek for the technical advices and suggestions provided by professors of Kyoto University. On the other hand professors could utilize the kiln facilities of MMC to carry out a variety of tests and experiments. From these collaborations a series of new products were developed and successfully commercialized. Akira Murata was able to keep abreast with the recent technological trends of industrial ceramics and electronics components industries in the world through professors of Kyoto University. This collaborative relation could be considered as an early form of close alliance between university and private co-operation. Lack of education and technical knowledge of Akira Murata was not the obstacle for the growth of MMC but the prime mover to prompt him to seek for innovative ideas and technologies.

(2) R&D Oriented New Products Development

MMC kept continuously a very high rate of R&D investments so as to produce a series of new products. In the year 2000 alone MMC spent \$ 274 million or 6.0% of net income on R&D investments.

(3) High Growth of Electronic Components Industry

MMC's products were of greater demand in consumer and electronics components industries

which were leading sectors of the Japanese economy in the post-war period.

(4) Family Oriented Management System

Family members of the Murata were involved in the management of company from the early period playing the pivotal roles at the critical junctures of expanding the company's activities, domestic and overseas.

(5) Aggressive Overseas Operations

MMC started overseas operations from the 1960s through M&A activities and the establishment of subsidiary corporations. In addition, MMC acquired the latest technologies from various sources through the conclusion of licensing agreements.

(6) Flexible Organizational Strategy

MMC used an organizational strategy of "factory company system," in its early phase of expansion and later adopted a matrix management system to manage a variety of products group operations.

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