THE DEVELOPMENT OF RESEARCH RELATED START UP

A FRANCE - JAPAN COMPARISON

April 2000

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I) THE KEY- ENTERPRISES OF THE NEW INDUSTRIAL SYSTEM[1]

The economic competitiveness of a country as well as the full employment depend on the quality of its companies but also on the structure of the industrial system and the balance of its components. After having completely relied on their large companies, France and Japan discovered that their system of SMEs was at least as important. But a more precise analysis indicates that only a small fraction of SMEs play a key part in the dynamics of the industrial system and the creation of jobs. This is yet a simple intuition that remains to be transformed into an usable concept.

It is only then that the policy of support for companies could be better targeted and therefore more effective. The " equal support policy " could be replaced by the " fair support policy ", this obviously making sense only if there is a certain consensus on what " fair " means.

I,1) GLOBAL DESCRIPTION OF THE NEW ENTERPRISES SYSTEM

I,1,A) Large Companies and SMEs:

Although the most purist of the economists contest that the size of a company is a determining parameter, it is now recognized that SMEs and large companies have different roles and operating modes. Among many studies, let us cite a recent study by the French ministry of Industry[2] , which compares the Large companies / SMEs system in 7 industrialized countries (the case of Japan however being less thorough).

Let us examine the table 1, which compares the distribution of employment between SMEs and large companies: the countries are classified by decreasing fraction of SMEs employment. The good places of Italy and Germany correspond well to the current ideas, which praise the quality of their SMEs. The surprise comes from the Japan/ United States inversion : Japan is known abroad for the prevalence of its large companies which however employ only 30% of the workers of industry whereas American SMEs, to which one allots the full employment of this country, provides only 30% of industrial employment.

Admittedly it is necessary to relativize these figures which do not take into account the services sector. But one cannot ignore them, and the interpretation given by the already quoted report is very useful to understand the problem which we are dealing with: actually it is not the total number of SMEs which counts, but the relative importance of a certain category of SMEs which it could be useful to count after having defined their profile.

I,1,B) Three categories of SMEs.

a)Traditional subcontractors:

In the countries dominated by the large companies, the great majority of SMEs depends on them very closely ; in fact they are part of the block of the large companies. Those have a considerable fraction of their production made by these sub-contracting SMEs (the so-called " disintegration " phenomenon)[3]: this fraction seems relatively weak in the United States; it is on the contrary massive in Japan where the SME wages are definitely lower than those given by a Large Company.

[1] This chapter was written with the precious help of Philippe Mustar, Professeur à l'Ecole des Mines de Paris.
[2] Reference : "Les PMI dans les grands pays industriels", Ministère de l'Industrie (MEFI), July 1999
[3] It is not the place to enumerate the causes, which are very well described by specialized works.

b) Districts of SMEs (clusters…):

They are SMEs that acquired their independence with respect to the large companies, thanks to their organization in group of interdependent companies. But they work in general in traditional sectors (textile, furniture...). Italy offers the most famous examples of such clusters.

c) Industrially independent SMEs (SMEs of the 3d type)

Remains a whole set of SMEs which are able to keep their industrial independence[4]: by their capacity to grow, because they are innovating in terms of own products and services, by the nature of the interactions which they establish with the other companies, also by the sector in which they produce.

In this third category we can identify :

- High-tech SME, whatever their size;
- SMEs providing a "qualified " service to their client companies;
- " Gazelles ", i.e. SMEs with very strong growth
- In a general way any SME which has diversified customers and ensures its competitiveness by innovation (to the full extent of the term, i.e. technological, managerial, marketing, etc).
  Germany's middle size enterprises are an excellent example of such independent and sturdy companies, producing their own products (capital equipment's as well as consumer goods). Their competitiveness is based namely on the quality of their Technology and the reputation of the services associated to their products.

These SMEs multiplied in the United States in the Eighties and especially ninety. It is said that it is they which ensured in this country the growth of employment.

The industrial system (by taking the word "industry" in the broad sense, i.e. including any product and service) tends towards a new balance between the system of the large companies (those and their subcontractors) and independent SMEs. Those contribute in an important way to the full employment, with the innovation in all its forms; they hustle the established positions and allow the renewal, the modernization of the fabric of companies

I,1,C) Research related start-ups. " Catalytic " SMEs

Among these "third type" SMEs one has to recognize the importance of those which, in a more or less direct way, are related to research.

a) A study by Philippe Mustar :

We give in appendix 1, a summary of a study, made by Philippe Mustar in 1996, that describes a large sample (300) of "research related start-ups" established by French Scientists in the recent years. The results seemed rather surprising at this time but are now confirmed by the spectacular success of the "High Tech start-ups".

- The rate of failure of these "research related start-ups" is small, indeed quite smaller that the average one. More than 85% survived after 6 years.

[4] The fact that some of these SME are subsidiary companies of great groups (they are thus financially dependent) does not seem to affect the behavior and the role of these SMEs.

- The average size after 6 years reached 20 employees, much more than the average number (4) for the normal young companies. However the number of success stories ("gazelles") was limited in the sample of this study.

- The success of these start-ups was generally related to two very strong interactions :
  - with the clients (they help to define the product, to increase the performance, to multiply its applications…)
  - with the research laboratories, namely the one where the founders of the start-up come from.

- More generally, these start-ups operate within a very interactive network, including investors, customers, suppliers, laboratories, competitors…This network is normally international.

b) The catalytic role of the "research related start-ups" :

The study we have just summarized, as well as many other examples, proves that these enterprises play a very significant role within the industrial system, although their numerical importance is small . Indeed through the services and products which they offer to their customers, they induce strong changes and growth in these client companies : that is why they are called "catalytic". Let us cite some examples:

- A company is specialized in the construction of customized machines : the success comes from the synergy between the know-how of this company and the competence of the client on the product to be manufactured. The competitiveness of the customer can be considerably reinforced.
- Another company introduces Microwaves Technology into a multitude of companies belonging to various sectors. As an example one of them developed a new process which allowed it to grab almost the entire market of an important sector of packaging.
- Another company upsets the sector of molding (a few thousands companies) through its data-processing management of prototyping, reducing times by a factor 10.
- Let us point out also the great mass of Internet based companies which distribute targeted information, allowing their customers to optimize their management and to increase their productivity.
- The Biotechnology start-ups now develop the great majority of the new molecules and proteins... which are then industrialized by the large pharmaceutical companies; those now almost entirely rely on the work of these start-ups (and of university laboratories) to renew their products.
- Service companies (including tests, research under contract, customized components, etc.) became the most important vectors of Technology transfer. Many are "Research intensive Companies", i.e. that engineers and researchers constitute the near total of their manpower.

The majority of these start-ups are connected to research, either as direct spin-offs, or as spin-offs of spin-offs. Actually it is from laboratories that come the majority of really radical innovations, i.e. the innovations which hustle the economy by inventing new needs, by forcing the traditional companies to change their products, to more or less deeply transform their system of production. It is they which lead to the " new economy " based on knowledge.

<u>In short two key words generally characterize the role of the start-ups resulting from Research: either Technology transfer, and/or first development of a radical innovation</u>

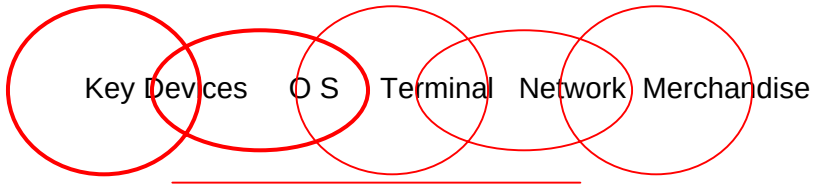
I,2)THE " 5 CIRCLES MODEL "

This 5 Circles Model is the portion of the study: "Transformation of Japanese Enterprises' Strength Through New Business Model Creation" NISTEP Policy Study No.3 by Noby Maeda in 1999(see Appendix 2). In this study, he is emphasizing the key roll of high tech start-up for electronic key devices business for the Japanese new business model development.

In a age of shifting from the Industrial society to the Information society, Key Devices are strongly related to Network Business. Network Terminals are operated with the tiny Operating System, which works with the Key Devices. And Contents are distributed through Networks to the Terminals such as Set Top Box at home, Mobil Phone at out door or Navigation System in a car.

In a information age, business value chain consists of these five factors: Key Devices, Operating Systems, Terminals, Networks and Merchandises. Key Devices are linked with Operating Systems, and Operating Systems are linked with Terminals, Terminals are linked with Networks and Networks are linked with Merchandises. In this way these five factors are making a 5 Circles value chain model.

5 Circles Model



E Business 3 Circles

The new industry in a information age mainly comes out from the 5 Circles Chain, and not from out of it. Entrepreneurial business, which creates new industry, comes from the 5 Circles value chain. Business outside of the 5 Circles value chain will not carry strong impact to new industry creation. Big business which are located far from the 5 Circles Chain will rapidly loose the power in the industry. Eventually more than half of total GDP will be performed on the five Circles value chain.

Entrepreneurial businesses inside the 5 Circles Chain need to have strong alliance with the leading big companies to survive, at the same time the big companies need to have partnership with the fast moving creative entrepreneurial companies to survive, too. In this global society, alliances with foreign companies are essential for new technology development and global marketing. Big companies are searching the most advanced technologies and business concept to work together.

It is a good chance for start ups to have equal partnership with big companies. In order to create competitive edge, the 5 Circles value chain environments are forcing the combination of the big companies and entrepreneurial start ups, Key Device companies and Network companies, searching the world best technology or service in a world wide base.
This is a good chance for Japan and France, who have relatively strong R&D and technology bases. R&D and technology oriented companies need to shift their resources into the 5 Circles area with IT (Information Technology) and communication capability, so that the technological competence can be utilized on the information age.

In a dog year-fast moving information age, big companies have limitation to cope with the change. Countries need to foster entrepreneurial movement to stimulate the old style industry. In US, in many cases, entrepreneurs created new industry by themselves, not

depending on the old companies. Old companies were busy restructuring themselves reducing manpower. In Japan and in France, the business restructuring model will be different from US. Big companies and start ups will have alliances and utilize the value of counterpart, and jointly develop new industry and create new employment.

The big company and start ups combination is a good place to combine key devices and network. It will help to create 5 Circles value chain rather easily. Japan's advancement of using cell phone to internet services is a good example. Many system LSI oriented high tech start ups are working jointly with big companies as a equal partner to lead the world in this new business field. Same thing is happening in molding to help car manufacturers and cell phone manufacturers.

In Japan, about 10 to 20 very influential High Tech start ups are emerging in the past 5 to 10 years and starting IPO. Majorities of the founders of these start ups are ex-big company elite engineers. Creating High Technology start ups from universities and from national research centers is the key issue to successfully accelerate Japan unique 5 Circles value chain.

II) THE THREE OBSTACLES TO THE RAPID MULTIPLICATION OF KEY-COMPANIES :

The governments realize little by little the importance of these third type companies and they want them to multiply as quickly as possible. This works very well in the United States, but less in Japan and in France, where the situation, while improving, is still far from satisfactory.

II,1) CREATION OF START-UPS IN FRANCE AND JAPAN

II,1,A) The present Japanese situation

Entrepreneur History in Japan

Mr. Ibuka and Morita established Sony in 1946, Mr. Honda established Honda Motor in 1948, and Mr. Inamori established Kyocela in 1959. That was the beginning of Japanese "Business venture" history after World War II.

After that, in 1970, came the so called "First Venture Boom" and some adventurous people established venture companies. The second Venture Boom came in 1982, and many financial companies set up "Japanese style" venture capital companies (see later). The third Venture Boom came in 1994 and many governmental support policies were developed. This third boom is still continuing and it has become a national consensus that venture business, and not the big companies, will create new industries. For example, Mr. Masayoshi Son, founder and CEO of Soft Bank, has boosted up Internet business all over Japan[5].

Japan's key items of venture related activities and policies are shown on (Chart 1,2).

Companies Establishment, Shut Down Ratio in Japan

A serious problem in Japan is that the number of companies being established in recent years is inferior to the number of companies being shut down. On the contrary the US is showing a healthy high figure for company establishment.(Chart 3). Japanese economy is turning towards a shrinking cycle in the number of companies. This is a negative sign for promoting venture business, which eventually creates new industry and new employment.

At the "SME Promotion Congress"[6], the definition of SME changed. In the past, SMEs were considered as weak organizations compared to big companies, and how to protect them was the main purpose of SMEA (Small and Medium Enterprise Agency) policy making. But now, SMEs are considered as a source of new business development, and SMEA supports will focus on the innovative SMEs, who want to create new products, industries and employment.

[5] In US, the first venture boom started in 1967, and Intel was created. The second Venture boom started in 1978, and Micro Soft was established. The third Venture boom started in 1993, and many Internet related business were created

[6] In November 1999, the Japanese regular Congress, which continued for several days under the leadership of the Prime minister, was mainly focussed about the revitalization of Japanese industry competitiveness, especially from the view of entrepreneurial Business. Many regulations to support innovative SMEs were decided.

The official document of the government home page of “Principles of the Policy Measures for Economic Rebirth” says in English : “Basic philosophical aspects of policies for small and medium enterprises will be overhauled, by identifying them as a principal source of dynamism in the Japanese economy and promoting the healthy development of diverse enterprises.” This is a drastic change of policy for SMEs, and a very good impact can be expected in the future for developing venture business.

At the same time, a “Target Number of Company Creations” was indicated for the first time by SMEA-MITI (Small and Medium Enterprise Agency which belongs to MITI). Basically the target is to “Double the Establishment of Firms”. The current number of creation of firms is about 140,000 firms per year. In five years, i.e. In the year 2005, the number of created firms will increase by 100,000 and become 240,000, and it will be about 7% of the total number of firms. Coming closer to US’s 13%.

SMEA-MITI set a definition of “Innovative SME” in 1995 ; since, about 5,000 firms have received the ‘label” that recognizes them as having unique core technology or service, and extend to them favorable financing and tax condition to support R&D, marketing, service and IT (Information technology) development, etc. SMEA/MITI determined a target number for this, too : in three to five years, to triple the number of “labelled” innovative SME from 5,000 to 15,000.

II,1,B) The present situation in France:

The French situation is comparable with that of Japan and is characterized by a persistent reduction in the number of company creations[7].

The number of these creations fell from 200 000 per annum in 1989 to 166.000 in 1997.

Among these created companies, only 5000 can be considered as innovative and only 1150 as innovative technological companies. The total number of industrial SME decreased by 13% between 1990 and 1996 (whereas this number increased by 6 percent in Germany and 26 percent in Italy).

It is widely admitted that the causes of this situation are essentially cultural. For about fifty years France had privileged the development of large companies and the French affirmed a clear preference for an employment in a large company, or in the public function. The creation of a company did not bring the same social prestige as an activity of engineer, manager or scientist. The sanction of failure is characteristic of this general attitude of distrust with respect to the entrepreneurs. Whereas the Anglo-Saxon countries perceive failure as a learning experience, France sanctions the failure very severely, at the legal as well as at the social level.

But, as in Japan, there has been in the past three / four years a strong awareness of the importance of SMEs and particularly of innovative SMEs. We will point out, throughout this report, various measures which were taken by the government. Let us quote a declaration of the Prime Minister pronounced at the time of “ Assises de l’innovation “ on March 12, 1998: “The innovation constitutes a major stake for the French economy. By the emergence of new activities in the advanced technologies but also in the services, our country will be able to find a stronger growth and to offer qualified employment to the greatest number. Such is the conviction of the government “.

In this new dynamics, the entrepreneur tends to become a “ hero “, who takes risks for the greatest benefit of the community.

[7] Since December 1999, when this report was written, the « Internet tide » produced positive effects. But they are too recent to be taken into account for this analysis.

II,2) THE THREE OBSTACLES

The governments would like these third type companies to multiply as quickly as possible. But the flow of entry into the industrial system of these key-companies is limited by the 3 causes, which are going to be described, and that one can define as “bottlenecks “.
They are :

Lack of “ patient capital “:

To invest in an innovating company can be very profitable, but it is only after many years[8] and by taking the risk of failure. Financial flows thus tend to be diverted from venture capital. As for the entrepreneurs, they fear the arrival in their company of shareholders that will weigh on the decisions. Few of them agree to sell their company (or to yield the command of it) when the growth of the company requires it. Years will be necessary to overcome these cultural obstacles.

Lack of credible projects :

The professionals of venture capital like to say that the projects to be financed constitute the true bottleneck. Whether they exaggerate or not, it is true that a great and well-targeted effort is necessary to mature an idea until the stage where it can really be used as a basis for a viable company. The experience shows that a favorable environment supports this ripening and increases considerably the number of viable projects.

People:

There is no creation of companies without the will of a man or a woman to become an entrepreneur. This implies a risk, a rupture that certain cultures encourage, that others on the contrary disapprove. Unfortunately France and Japan form part of the countries where the career in a large company or the public administration, is better considered than the creation of a company. Schools do not give young people the taste to become an entrepreneur and do not teach them the techniques of creation.

These three causes are combined to strongly limit the number of company creations[9]. It is a fortiori the case in the new sectors where the risk taking is stronger because neither the prospect for market, nor technologies are known. Actually it is much too rare that simultaneously a valid creator, a viable project and a convinced investor appear in these new sectors, those indeed that it is urgent to develop. Japan and France realize now the amplitude of their difficulties in these three fields. On the three fronts they are late compared to the United States, but they are now actively developing policies which are going to be compared.

[8] With an important exception for the Internet companies
[9] See Note 6

III) MONEY: LACK OF CAPITAL VENTURE

III,1) THE " CHIMNEY EFFECT "

The risk of failure of a start-up is strongly limited when the equity capital is important. Its amount and its nature depend of course on the age and the size of the company. To illustrate this diversity one can use the image of a chimney. At least three elements are needed to build it and make it function correctly:

- A the base of the chimney, the hearth where the company starts, thanks to the contribution of a small but high-risk capital, the " seed money ".
- At the top an of the chimney, an outlet towards the outside which makes it possible the chimney " to draw ": this is the role of the markets specialized in start-ups, the best example being the NASDAQ.
- Between the two, a structure that gives to the chimney its height and its solidity: This is the role of the venture capital companies. They are reticent to invest at the start of the company but the considerable sums that they bring later will be essential to ensure the fast growth of the start-ups, and in particular for a IPO.

III,2) NASDAQ TYPE MARKETS

Why aren't the traditional markets adapted to the " gazelles " (cf. II,B)? In what specialized markets of NASDAQ type are they different and how do they function. Many authors discussed this subject.

III,2,A) The American reference

Trading on the Nasdaq (National association of security dealers automated quotation) Stock market began in 1971.

- Today, Nasdaq is the fastest growing stock market in the United States – and ranks second among the world's securities markets in terms of dollar volume.
- For the year 1998, share volume reached $200 billions, up 23% from $164 billions in 1997.
- The market value of the 5126 companies listed on Nasdaq stood at $2.6 trillions, up over 44% from year-end 1997.
- Average daily share volume on Nasdaq reached over 802 millions shares in 1998
- Twelve non-US companies listed in the fourth quarter of 1998, bringing the total number of foreign companies listed to 440.

Nasdaq is a screen-based market, operating in an efficient electronic environment. Nasdaq's market structure allows multiple market participants to trade stocks through a computer network linking buyers and sellers from around the word.
Two separate markets comprise The Nasdaq Stock market :
The Nasdaq National Market : 4400 companies
The Nasdaq SmallCap Market for emerging growth companies : 1800 companies. The financial criteria for listing on this market are somewhat less stringent than on usual markets . but it is compensated by a complete transparency about the performances; the goals and the risks.

III,2,B) Nasdaq type stock-markets in France:

The "Nouveau Marché" was created in February 1996 ; two reports written in 1994 had exposed the need. Working groups that gathered financial experts and policy makers defined its functioning. Three years later (July 1999) the assessment is as follows : 112

companies are listed on the " Nouveau Marché ". The daily value of exchanges has climbed to 15 Millions of Euros (3000 exchanges). The total capitalization has reached 12 Billions of Euros.

A European association, EuroNM, gathers the "Nouveau Marché" with four partners : the "Neuer Markt ", the "Nuovo Marketo", the "Nieuwe Markt" and the "EuroNM Belgium" equivalents. 346 companies listed; Capitalization : 162 Billions of Euros.

EuroNM has a competitor in Europe: The EASDAQ established at Brussels (plus Paris, London and Frankfort) : 71 companies listed ; Capitalization 57 Billions of Euros[10]

A Nasdaq-type market is characterized by conditions for admission more flexible than for ordinary markets. For the "Nouveau Marché", there are no conditions concerning the turnover, the profitability and the accounting history.
On the other hand a perfect transparency is demanded on every aspect of the Business plan (strategy, prospects for growth, risks, etc…). The minimum asset of the company should be 1,5 Millions of Euros and at least 50% of the raised funds (5 M.Euros minimum) should correspond to a capital growth.

For those companies that still find this IPO process too difficult or time consuming, another market (the "Marché libre") was created in 1998 (already 54 companies listed).

III,2,C) Nasdaq type stock-markets in Japan

Compared to US stock market, it is often said that that IPO for a Japanese company is the **goal,** and for a US company is the **start**. The barrier to enter Japanese stock market for entrepreneurs is very high ; one needs to show many years of good tracking records with profit ; but once you succeed IPO it is relatively easy to stay listed on the market. On the contrary, in US it is relatively easy to make IPO with a few quarterly disclosures, but it is difficult to stay unless you show steady and healthy growth[11].

a) The Tentou market

For the Japanese entrepreneurs, "Tentou Market", Over the Counter Market, is equivalent to the ex-"Third Market" in France (not to the relatively recent Nouveau Marché). Tentou Market was established in 1976 in Tokyo. Currently about 900 companies are registered on this market. Each year about 50 to 100 new IPO are coming in, and very few are going out. The number of IPO in the past 5 years are: 1994:106, 1995:137,1996:112, 1997:105,1998:62. In US, the number of IPO is about 500 to 1000 per year.(Chart 4)

In 1999 about 73 companies entered this market ; 34 companies out of these 73 are technology or IT related companies. The average number of years from creation to IPO for these 73 companies is 26 years and 2 months ; the shortest is 3 years and 1month, and the longest 63 years and 4 months. This is another comparison to US, where the average time to IPO is 3 or 4 years.

[10] See Table 2 ; all figures are given for the end of 1999

[11] A similar difference difference can be observed between the Japanese and American University systems. In Japan, to pass the University entrance examination is very difficult, but once it is passed, no hard study work is necessary and the majority of students can easily graduate. In US it is quite the contrary.

b) New competing markets are changing the rules

Until recently, the Tentou Market did not have a good reputation because of the high number of stock prices falls right after the IPO. Since1999, thanks to internet related IPO, the stock market has been very active and within a year the average price has gone up from 700yen to 2400yen, more than tripled.

Mr. Masayoshi Son, CEO of Softbank jointly with Nasdaq, surprisingly announced to open "NASDAQ Japan" in 2000, which was enthusiastically welcomed by many Japanese entrepreneurs. The Tokyo stock market quickly decided to establish another new stock market for entrepreneurs called "Mother Market" to cope with "NASDAQ Japan". "Mothers Market`s" IPO qualifications are relatively looser than NASDAQ, and far looser than Tento. (Chart-5)

Thanks to the "invasion" of NASDAQ into Japan, the conservative rule of IPO is drastically changing due to the competition of three different markets for entrepreneurs; 1) Tentou Market, started 1976 2) "Mothers Market", starting Dec.1999 3) "NASDAQ Japan", going to start late 2000.

For the "Mothers market" two companies are already accepted for IPO, and about 20 companies are ready to register. For the NASDAQ Japan, hundreds of entrepreneurs are showing interest to make IPO in a near future. MITI and SMEA are clearly showing intention to support the increase of the number of IPOs.

The Japanese reservoir (so called "green sheet market") of eligible companies, which didn't yet go public (successful IPO) but have the potential to, is almost nil. On the contrary, in USA , they have a very wide base of eligible companies. (Chart 6). Underneath NASDAQ, they have "NASDAQ Small Cap" with 1800 companies, "OTC Bulletin Board" with 5500 companies, "PINK SHEET" with 2400 companies and "Local Market" with 10,000 companies. In order to increase the number of IPO, Japan needs to expand this base of active and creative SME wishing to grow and enter into the open market in the future.

III,3) THE VENTURE CAPITAL INDUSTRY

The venture capital industry is not very old. Born in the United States in the fifties, it really developed only since the seventies when its growth became very fast. It is now widespread in Europe and in Japan(see Table 3). Two remarks:

A) The venture capital activity is divided into three large branches: the investment in the start-ups (and the support for the innovating projects of adult SMEs); the development (in general external) of existing firms; transmission of company (LBO). The seed money, which we will speak about later, is another component.

With regard to our problem, only the first activity (Start-up Venture Capital) really counts and is the one that must be measured for international comparisons.

B) The activity of venture capital directed towards the start-ups is generally an action of proximity. The follow-up of the business requires frequent contacts indeed. For example the venture capital of " Silicon Valley " seldom invests apart from this zone.

III,3,A) The American reference

It is useless to tell the history of the venture capital in the United States. The broad outline is well known. One can however point out some facts and figures.

- Venture capital has existed for more than 40 years, but it really developed only at the beginning of the Eighties, under the triple effect of the creation of Nasdaq, of favorable

tax systems (RDLP) and of the authorization given to pension funds to invest in venture capital.

- The growth of venture capital was very fast during the Eighties . It started again with the development of the new economy ($M 5200 in 1991, $M 9900 in 1996, $M 16700 in1998, $M 9000 for the last quarter of 1999….).
- The distribution between the principal sectors is the following (last quarter of 1999) : Communications : 29% ; Software: 24% ; Business Services :14% ; Consumer : 9%; Health care, Biotechnology, Pharmaceutical and Medical Instruments (11%) ; Distribution : 7% ; Hardware(6%).
- The American venture capital has a very local character. Venture capital companies invest only in a limited area, that they already know well (for example there is the Silicon valley Venture Capital, the one of the Washington Area, of the Harvard –MIT area, of Austin, etc.). On the other hand these zones of investment are relatively rare.

III,3,B) The Venture capital in France:

In 1995 the situation of the French Venture Capital was still considered as mediocre :

- The amount (850Millions of Euros) was small compared to the American Reference (hardly 10% in relative value).

- Worse, the part going to creation and post-creation was only 7% of this sum.

But in 1998, and even more in 1999, the situation was drastically improved :

- The investment has doubled (1890 millions of Euros) while the raised capital jumped from 750 M€ to 2600 M€.

- The part going to creation and post-creation has jumped to 14% (27% of the number of projects)

Four measures supported this growth:

- In 1996 the statute of venture capital companies was improved. This is the case of the FCPR (Common funds for risk investments) ; its status is very close to the American “Limited partnership funds” considered as the best for Venture Capitalists : these funds exist since 1987, but their statute was revised in 1996 in close connection with the profession. It is on this date that the FCPI was created (Investment funds in the Innovation); it is a special FCPR favored with a very advantageous tax statute, the constraint being that 60% of the funds are invested in innovating projects. There are currently 6 FCPI (July 99), which have raised approximately 500 millions Euros (250 in 1999).
- The creation of the “Nouveau Marché” allowed an easier and more advantageous exit of the capital invested in the start-ups: previously one could recover capital and capital gains only by reselling the start-up to another company or by going on NASDAQ, which is not always easy for non American companies.
- The insurance companies recently acquired the right to invest in Venture capital Funds; they even have now to do it, if they want to benefit from certain tax advantages. Let us recall that a determining factor of the starting of the venture capital industry in the United States was the authorization given to the pension funds to invest there.
- The Government created, long time ago, a Company of guarantee whose advantages has been extended to the Venture capital: The SOFARIS refunds 60% of the invested capital in a start-up which goes bankrupt; the contribution is much lower than would be a normal insurance premium, the difference being provided by the Ministry of Finances.

The regional Venture Capital : In more than 20 French Regions[12] , were established "regional venture capital companies", in general strongly supported by the regional government (regional council). One could have feared some drifts in the choice of the investments; the political considerations could weigh more than the potential of the projects. One can currently affirm that these companies kept their professionalism and their preoccupation for profitability. This was helped by the action of a national bank, the CDC (Caisse des Depots et Consignations), that in exchange of its participation in the capital of these regional companies imposes rules of good management

III,3,C) The Venture capital in Japan.

In 1972 KED, Kyoto Enterprise Development, was established as the first private VCC (Venture Capital company). Kyoto's business leaders' group learned from the famous US Venture capital company ARD. NED and JAFCO followed in the same year. Both are subsidiaries of Finance companies. JAFCO, a subsidiary of Nomura Securities, Sanwa Bank, Nihon Life Insurance and some others, is the leading VCC in Japan.

Currently there are about 150 VCCs. Half of them were established from 1982 to 1986, a period which is called the 2nd venture boom in Japan, and about 30 other were established after 1995. The majority of these 150 VCCs are Finance companies' subsidiaries, and about only 40 companies are independent from banks, security and insurance companies. (Chart7)

Because of this financial subsidiary background, the majority of Japanese venture companies mission and characteristics are totally different from American VC companies (VCCs). The Japanese VCC's primary mission is to find (detect ?) healthy growing companies to which parent Finance company can put loans or issue commercial papers. They are still reluctant to accompany their financial support with help for marketing, legal, patent and licensing.

Because the majority of Japanese entrepreneurs do not like to get equity money, and prefer loans to keep domination on their own company, Japanese style VCCs are somehow welcomed. This is one of the main reasons for the lack of activity of Japanese entrepreneur venture business. These VCCs, of course, prefer to put money on later stage just before IPO, and not to the early stage of the start up, where the risk is too big for them.

Very recently, however, several new generation of VCCs have been established. For example, two elite venture capitalists quit JAFCO and set up their own VCCs, focusing intentionally on start ups and providing them with capital. They are Global Venture Capital Inc. and Nihon Technology Venture Partners (NTVP). At the same time, some of the successful "venture companies" like Softbank and Hikari Telecommunication have started their own VCC and have invested hundreds of US millions in many start ups both in Japan and USA. On top of these new movements, some of American and European venture capital companies are starting to step into Japan. Like "NASDAQ Japan", these foreign VCCs will accelerate the change of attitude of entrepreneurs on how to cope with VCCs in Japan.

A Venture Capital Company itself is a typical "venture business". When the new generation of Japanese VCCs become successful, many young MBA will follow them and develop American style VCC activities to support entrepreneurs. Finance companies related VCCs could be utilized at the later stage for growth.

[12] France is divided in 22 regions; each one elects a « Conseil Regional », chaired by a President who has extensive powers, a special administration and an important budget.

In 1999, Japanese government took a major step by allowing "venture partnership funds" with limited responsibility for investors, somewhat equivalent to the American "Limited partnership funds". Admittedly a first partnership VC funds was established in 1982 by JAFCO. But, up to this new law, to invest in such funds meant unlimited responsibility towards any firm financed by the fund. That prevented individual people and pension funds, which are the biggest investor in US, to invest there.
On the other hand the new law introduces "fiscal transparency", which prevents double tax paying and represents one of the major advantages of the American Limited partnership and the French FCPR (see III,3,B).
This change of the law will encourage individuals and pension funds, and eventually increase investment funds in Japan to "venture business".

It is to be noted that there is no Company of public guarantee equivalent to the French SOFARIS (see above § III,3,B).

III,4) THE SEED CAPITAL:

With regard to the creation of company it is the most important factor. However the traditional venture capital stays away from seed funding, considering that its operating mode does not enable it to be profitable if the investment is lower than a million dollars, which very largely exceeds the sums necessary for starting. But other solutions help the entrepreneur to reinforce the own funds of its company beyond his personal contribution.

III,4,A) The Business Angels:

They are private investors, but this activity implies an active part in the management of the start-up (about one day per week). This excludes more traditional investors such doctors, dentists, and rich retired people ; the angels, are almost all former owners (or even industrial executives). They are rich having sold their business well; here they find a new job, exciting and which can be very profitable.

a) The American reference ;

In US it is said that total business angels funding is twice as large as the total VCCs funds. Their investment is high: in Silicon Valley from 50.000 to 100.000 dollars. Frequently people who have developed and sold a successful venture business are investing millions of dollar in one start-up, and ordinary upper class business persons invest $10,000 to $500,000 through "angel funds network companies". The number of angels is close to half a million.

All the actors of the American innovation/creation system insist on the fact that the advice provided by a Business Angel is a contribution as invaluable as its financial injection.

The angels and the start-ups meet in forums, where the start-ups come to present their project to a group of " Business Angels "; in clubs of Business Angels; via " brokers "

b) Business angels in France:

Until 1997 there were very few of them, twenty or thirty. Since then the situation has greatly improved. It is difficult to count them and evaluate the total mass of their investments[13]. One can however quote some significant facts:

- The number of clubs and organizations of business angels multiplied.

[13] However the Anglo-saxon tradition of a strong involvement of the Angel in the start-up matters is far from being generalized, frequently because of the entrepreneur's reluctance.

- Conferences have been organized to discuss their problems
- Some financial reviews have devoted an important place to " Business Angels ", for example the newspaper " Le Revenu " where approximately half of the pages are filled by information and anecdotes on " Business Angels ".

Tax advantages :

A tax advantage has been granted, by the Madelin law (1995), to private people who invest in SMEs and in particular in a company in creation (50 percent of the invested sums are deductible from Income tax with a ceiling of 6000 Euros). This provision has been largely used (1000 million Euros in 3 years), but it relates especially to the very first phases of the investment (the first circle, that of the parents and the friends) and much less to the " Business Angels " themselves who invest from 50.000 to 100 000 Euros.

c) Business Angels in Japan

In Japan several famous successful venture business people are starting to act as angels, investing pocket money of $50,000 to $500,000, and bringing practical support as a mentor. And some of the venture business, including US venture subsidiaries, are starting so called "angel network funds " to gather normal business persons money of $10,000 to $500,000. But this is not yet popular in Japan.

The amount of saving by Japanese people is enormous (estimated to $13,000 billion). But it is essentially deposited in banks. However Japanese people are gradually shifting their money from normal banking accounts to "asset management accounts", investing in investment bank's packaged investment funds, which is relatively less risky. They are not yet ready to invest in venture business directly or indirectly as angels.

d) « Angels Tax » in Japan

In June 1997, Angel Tax was first installed in Japan. However the system is not attractive at all as compared to US angels tax. Capital loss can be carried forward for three years, and in case capital gain occurred, carried capital loss portion can be eliminated from the capital gain. And that was all.

In November 1999, at the so called "SME Promotion Congress" (see II,1,A) , a drastic step was taken to improve "Angel Tax" in Japan. Three quarters of capital gain is not taxable if the capital gain is obtained within one year after IPO (Initial Public Offering). In US, this non taxed portion is 50 %. This may be the first time in Japanese venture supporting policies, that the Japanese system is more favorable than the US one.

However, Japan still needs to improve its Angel Tax System to boost angels' activities. The most important one is to match capital loss to the normal income within the same year. This certainly would stimulate angels to invest more in new enterprises. Portions of Japanese well known $13,000 billion private money savings need to be shifted to healthy risk money of venture business to create new industry of Japan. Comparison between Japanese and American Angels Tax Systems is in Chart 8. With the Angels Fund and the Pension Fund, the dynamic US Entrepreneur Business Model is making a positive cycle as shown in Chart 9.

III,4,B) Seed Funds:

Up to now this solution is rarely used because Seed Funds are very difficult to make profitable. The follow-up of the initial phases of a start-up is time-consuming. This represents a cost difficult to amortize if the invested sum is weak, which is the normal case at the start.

Those that exist in the United States are mini-funds, local and not specialized. They are carried out by very small teams and rarely go beyond the second round table. Their problem is not due so much to the bankruptcies (we have already said that the rate of failure in this very accompanied population of high-tech start-ups is weak) that to be “trapped“ in start-ups that remain small and that do not even go to the second round table.

Seed Funds in France:

We reported the importance in France of the regional venture capital:
A certain number of these companies created subsidiary companies specialized in seed capital. This is particularly the case in the Regions of Rhone-Alps, Languedoc, Midi-Pyrenees, Aquitaine...

- In addition the ministry for national Education launched a call for tender for the support of these seed funds. Some of them have a not local but thematic character. It is the case of the funds of biotechnology, in which invested beside financial private funds, two organizations of research, CNRS and the INSERM.

- Let us report finally funds supported by an organization of research:

- “ I source “, specialized in information technologies was launched by INRIA (that will be quoted in connection with the creation of the incubator INRIA - transfer).
- “ Emertech “, launched by the CEA, with a large scope of interest but partially specialized in materials and environment technologies.

In both cases the majority of capital comes from private funds

Seed funds in Japan

Based on a recent Nikkei Newspaper survey, six universities have set up venture funds jointly with venture capital or financing companies. And 35 universities have plans to establish university funds to invest in start-ups in which they are involved.

III,5) THE SEED PUBLIC FINANCING

III,5,A) The Anglo-saxon reference

The public financing of early phases of incubation/creation of high-tech companies remains very popular, even in US, UK and similar countries. In fact it still constitutes the major source of financing in the areas where the “ Business Angel culture “ did not develop yet; or (it is a dependent phenomenon) where the entrepreneurs/creators remain wary with respect to external capital. This is the general case in the Middle West and more generally apart from the “ Valleys “ (cf. § IV,1,B).

a) The Americans use massively the program “ S.B.I.R “: The SBIR program in US started in 1983 and contributed to foster technology oriented venture business. In 1997 eleven agencies of the federal government spent a total of about $1billion for supporting technology oriented venture business (SMEs with less than 50 employees), that developed R&D based

innovative projects. These 11 agencies are obliged by US law to spend 2.5% of their budget in this SBIR program.

About 3000 SMEs received $100,000 for a 6 months feasibility study, and about 1000 SMEs received $750,000 for a 24 months prototype development phase. Military related agency shares half of them, and about 30% of these SMEs sales are to the government department who requested the development.

In Europe there exists a similar form of financing (usually in the form of refundable advance in the event of success); but instead of being related to the Agencies of Research, they are in general managed by Agencies in charge of innovation (ANVAR in France, Senter in the Netherlands, …)

b) Another form tends to develop, that of the " loan of honor ". For example in Twente (program TOP) where it is 20.000 Euros for one year; or in Israel (40.000 Euros for 2 years).

III,5,B) French Public Seed Funding :

- The French solution consists of supporting innovation, not research. The operator of this program is ANVAR, a national agency acting through regional antennas (one by Region). The ANVAR distributes conditional loans, which can not be refunded if the failure is evident. These loans are granted if the project is regarded as technically innovating, but the priority is now given to the projects with the strongest growth potential.
This assistance to innovation is not reserved for the companies in creation, but these profit from a strong priority and they account for 25% of the aids.

As in the case of the S.B.I.R program, this aid to innovation finances first a feasibility study (limited to 40.000 Euros). The aid to the development phase of the project is naturally more important ; it is limited to 50 % of the expenditure actually engaged by the company and is established in the 100 000 Euros / 500.000 Euros bracket (but can reach 2 millions of Euros in some exceptional cases).

On the whole ANVAR distributes 70 millions of Euros per year to start-ups. It is to be noted that ANVAR has always developed a policy of risk, assuming that a high rate of success (superior to 50%) would mean a too conservative attitude, contrary to its mission.

- There is in addition a Funds for Research and Technology (FRT), managed by the ministry for national Education and Technology (MENRT), which grants contracts of research ;…..go to companies less than four years old

Loans of honor: The program " France Initiative Network " distributes approximately 1500 loans of 8.000 Euros (starting from gifts of private origin). "L'Ecole des Mines d'Alès" provides fellowships of 15.000 Euros financed by regional funds.

III,5,C) Japanese public Seed financing

- Nine years before the first private venture capital company (VCC) creation in Japan, the Japanese first venture capital organization was established in 1963 as "SME Investment Development Company Ltd" in Tokyo, Osaka and Nagoya, with central government and local governments financial support, based on a new law to support SME development. This System is similar to "SBIC" in USA, which was established in 1958.

Japanese MITI's Small Business Agency (SMEA) aids each prefecture's "Venture Business Supporting Organization". Support include equity investment and loans. In 1997 about $180 million were budgeted, but only half were consumed. These "SBIC like" VCCs are not working well. They have difficulty finding venture businesses to invest in . They are asking "Finance companies VCCs" to find good candidates to invest in. Both "financial company's VCCs" and local government's VCCs want to avoid risk as much as possible because of their fundamental nature. Bank money and taxpayer money, in Japanese culture, should not be invested in companies who might fail : this is not risk money, and not suitable for venture capital.

In Germany, the local governments match money invested in start-ups by private VCC's. Private VCC takes risk to invest, and local government joins the venture, believing that private company's judgement are better. With this regulation, many foreign VCCs stepped into Germany and many local VCCs were created or revitalized. Japan has to analyze this German method to vitalize venture business.

- In 1989, based on a new law (Shinki-jigyou-hou), MITI's nonprofit organization started to support high tech SME with financial support, like $2 million equity investment and $15 million loan guarantee. About 200 high tech SME are registered for this program.

- In 1995, based on a new law (Chuushou-souzou-hou) to support SME, SBA and each prefecture "SME support non-profit organization" registered about 5,000 SME all over Japan. The organization is extending various financial support, like $50,000 to $300,000 R&D subsidy, 7% tax reduction for machinery investment, guarantee of loan, $400,000 loan without interest and so on. In 1989, based on a new law (Shinki-jigyou-hou), MITI's nonprofit organization started to support high tech SME with financial support, like $2 million equity investment and $15 million loan guarantee. About 200 high tech SME are enrolled in this program.

- In 1998 Japanese SBA started a "SBIR-Japan program" (see III,5 A)), studying US system. At this moment, the major departments who may eventually purchase developed products are not obliged to join this Japanese SBIR program. Traditionally Defense Department, Environment Department, Nuclear Department, Space department and others prefer to order from big companies for R&D outsourcing for reliability reasons[14].

  In US, when the law was passed, every government agency was negative about depending upon SMEs or start up companies for highly confidential R&D items. But gradually government people realized that venture companies take risks and make breakthroughs that big companies reject. So nowadays, venture companies involvement in R&D is greatly welcomed by many American government departments. They are utilizing both SMEs and big companies in good balance. Japanese SBIR needs to reach this level within a few years.

Remark : Comparison of American and Japanese "SBIR Business Models"
American and Japanese Business model concepts of public financing are very different. As mentioned before, in Japan, public financing, which is based on tax money, needs to be utilized without high risk, item by item. So, investment to start-ups with high risk is not allowed, and this is not suitable to "Venture = High Risk". That is why venture funds budget are consumed only half in many prefectures in Japan.

[14] We speak here about this point of the S.B.I.R. program, that obliges Large companies getting contracts from the American government, to subcontract a few percents to SMEs.

On the contrary, as one can see in Chart 10, US-SBIR's business model is not "item by item based". It is based on total "Return on Investment". Even if tax based funds invested in hundreds of companies disappear due to bankruptcy, if tens of companies make big success and eventually pay big tax some years later, total return of the investments is much bigger than originally invested tax. So, the American agencies in charge of SBIR are encouraged to invest in high risk-high items[15]. This business model is better matched to the basic concept of venture than Japanese public financing business model. .

- .In 1999, JST, Japan Science and Technology Corporation, Science and Technology Agency (STA)'s non profit organization, started the so called Pre-venture Program. $800,000 subsidy per year for three years, will be given to University or research center researchers who want to start a business based on their own developed patented technology and with a business partner ; 10 researchers with 10 business partners were selected in 1999 from openly applied 200 proposals.

III,6) THE CULTURAL OBSTACLES TO THE GROWTH OF VC EQUITY IN FRANCE AND JAPAN :

The main objective is the growth of the equity capital in the start-ups. Many failures are due to its insufficiency, which weakens the young companies when they pass through the inevitable crises of youth. In the most favorable case the growth of a start-up produces such a strong profit that it makes possible to constitute these "own funds", or in any case to face the "growth gaps" or the accelerations of investment. But it is normally necessary to find capital outside the company, turning to the venture capitalists and later to the market.

Admittedly the situation has much improved in France, less in Japan. In both cases one is very far from the American level[16]. Let us point out the two cultural reasons that we mentioned in the preceding paragraphs:

- The investors, the institutional ones as well as the private individuals, do not like risky and not very liquid placements.
- The entrepreneurs consider the companies that they create like their children; they want to remain in control; they often refuse to become in minority in the capital and to having their company sold or changing orientation in spite of their will.

To fight against the first tendency, the two governments set up fiscal and security measures.

It is obviously much more difficult to persuade an company owner to open his capital. It can only be the result of an educational process that will be approached in chapter five.

[15] It was already mentioned that the French ANVAR is also encouraged to take risks
[16] Some worry about their too fast growth in the United States (a bubble?).

IV) PROJECTS: LACK OF CREDIBLE START-UPS

The preceding chapter shows that it is not so difficult to support the growth of venture . Actually the number of viable projects is becoming the more severe bottleneck. Many good ideas perhaps, but not enough which lead to a good " Business plan ". Rare are the creative candidates who are armed to build this one, especially in the field of high technology. This is why the governments, local as well as national, endeavor to set up structures and measures thanks to which good ideas will be transformed into viable and attractive projects for the investors.

IV,1) STRUCTURES FOR ACCOMPANYING THE BIRTH AND THE GROWTH OF INNOVATION PROJECTS (AND PARTICULARLY START-UPS)

IV,1,A) Definitions: 3 categories of structures:

To compare comparable entities, it is necessary to begin with definitions. In the past ten years different structures adapted to the various phases of the preparation, creation then growth of the enterprises have been developed. In fact these structures strongly differ by their mission, the services which they render, and the competencies requested from the persons in charge.

Structures of incubation: by definition an incubator is a place "where eggs are brooded". The mission of an industrial or scientific incubator is thus to help projects to hatch, the end of this phase of incubation being the birth of a company, it means the starting of its production and marketing activities[17] .

The phase of incubation leads to a " business plan", to the precise definition of the product or service to be delivered, the capitalization of the company and the installation of means of production / marketing. Services rendered by the incubator, (on which we will return) consist in helping the "projects carriers " to achieve these goals as quickly and as well as possible (in particular by training activities, by " mentoring "...).

The " nurseries " accommodate the "birds which can fly with their own wings ". The tenants of the nursery are enterprises that start their production and marketing activities. They still need advice and common services (testing facilities, secretariat.).

Technopoles (" Industrial Parks ") are broader structures. They are generally created by the local authorities to accommodate companies that come from outside and are expected to enrich the local industrial system and to create jobs.

It can happen that these industrial parks diversify and, in addition to their initial function, develop a " nursery ", and even sometimes a structure of incubation. But these two organizations have their own structure of management and a separate site.

In the United States an important fraction of Industrial Parks are called " Research Parks, or "Science Parks ". They, almost by definition, are established in contact with an university and profit from close bonds with its laboratories. Typically a Research Park comprises research laboratories belonging to large companies, start-ups (which seldom remain in the park more than ten years), plus a structure of incubation.

[17] The legal aspect (whether the project is given a company status or not) is not crucial; the choice depends only about practical considerations, varying from one country to the other.

More about the incubation structures.

Characteristics of a structure of incubation

Let us recall that the Incubation structures are intended to accommodate or to support candidates to the creation of a company; there they have the possibility of maturing their project in a favorable environment which offers them the material and intellectual assistance, whichever they may need. The stay in an incubator lasts from 1 to 2 years maximum, leads to a Business plan and, in a successful outcome, to the starting of a company.

The Incubation structures normally include two components:

The incubator:

- This is a place where the creators of companies find an office and all the corresponding facilities: multi-media means, conference room, documentation, photocopies, mail, data-processing workstation; sometimes, testing facilities allow the candidate-creators to develop and validate their product;

Moreover, the presence of several creators in the same place enables them to exchange their experiences.

The structure of accompaniment:

- The Incubation structures must indeed provide for the creators the following supports:
- " Architects of Business plan " which are normally permanent employees of the incubator; they help the creator to apprehend the whole of his problem and to put him in contact, as needed, with specialists.
- A network of these specialists (in particular in market studies, intellectual property, patents anteriority research, in company law) available when the projects carriers request their support.
- A network of private investors or public financial agencies (ANVAR, research organizations, financial aids dedicated to the creation of companies, local authorities...)
- laboratories developing the various technologies necessary to the development of the product;
- Mentors heads of companies who agree to sponsor a start-up during its incubation period. The persons in charge of the incubators insist on the importance (even the quasi necessity), of such a sponsorship.

Normally, the structure also provides the creators with courses that cover the various aspects of the creation of a company (cf. § V,2,C.).

It can also bring, in certain cases, remuneration comparable with a thesis fellowship; it can be a powerful support for a young creator often stripped of resources.

Finally the structure generally develops a system of detection which enables it to stimulate new projects then to select them.

Clearly it is the quality of this accompanying structure that will determine the performances, measured by the rate of success and the number of created jobs. In practice, it seems that these structures are more effective when they reach a **critical size**, that makes it possible to maintain a permanent staff numerous enough for covering the various fields and needs (4 to 5 people at least).

Incubation structures connected to Research

Many initiatives were taken by the universities, since it appeared that one of the best means of valorizing the ideas and Technology developed in the laboratories, consisted to create or make create start-ups.

For this category of creations, the experience has shown that the chances of success are strongly increased if the incubation and development phases of the innovation proceed in a context that combines:

- proximity of the laboratories that are at the origin of the idea or that can make an essential contribution;
- And, as we underlined, the availability of a network of experts and financiers who bring to the creators all the technical, managerial, legal and financial resources which are necessary to them[18].

Traditional incubators

The creation of high-tech companies based on the result of a research is a relatively rare case and should not make us neglect the traditional process of creation of products and services meeting the market needs, utilizing the best of emergent technologies, but without radical technological innovation.

Thus have been developed, a little everywhere, incubators without particular link with Research. Such incubators are incontestably useful. It is rare, however, that they transform the local industrial system and accelerate the development of innovating companies (and that they cause for example a strong development of the local venture capital).

IV,1,B) References: United states and Israel

Incubators have existed in the **United States** for quite a long time, at least thirty years. But only a few universities have incubation structures reaching the critical size, i.e. which produce at least ten " business plans " each year. Then they have an independent management. In the other cases the incubator is placed within the local structure of "valorization " (TLO) and shares its services and experts.

There are some private incubators. Those are coupled with venture capital funds and consequently are extremely selective.

Israel has developed in the last few years a very ambitious system. The ministry of industry supports a network of 26 incubators which, without being identical, pledge to respect certain standards. They are real Incubation structures in the meaning that was defined higher; the projects receive from the government an important capital asset (up to 85% of $300.000) provided that it is supplemented by private capital, at least 15% of the total.

In Europe let us quote SPINNO in Helsinki (Finland) and TOP at Twente (Netherlands).

IV,1,C) Incubation structures in France:

Traditional incubators: Integrated or not in Technopoles, these incubators are relatively rare; they are in general managed by the Chamber of Commerce (example of Novacités in

[18] If one refers to the foreign experience, it seems that a critical mass is there too necessary. It would correspond for an incubator at a minimum flow of about 10 start-up per year, which means at least one thousand researchers in the neighborhood. But more than the number of researchers, it is the specialization and the motivation of the laboratories which counts.

Lyon) or are created on the initiative of the local authorities (example of the Paris-innovation and of Bordeaux-Unitech incubators).

Incubation structures placed in contact with universities or "Ecoles d'ingénieurs":

Two years ago they were only four or five: Let us quote the three oldest one;

- Promotech in Nancy: the universities of Nancy created this structure in 1980. Later it was integrated in a technopole created by the city of Nancy. The unit functions like an American Research Park. The performances are good: approximately 20 Business plans per year, bringing to the creation of about fifteen companies; about thirty start-ups in the corresponding part of the park.
- The incubator of the "Ecole des mines d'Alès: it had functioned for ten years but it was started again on new bases in 1997.
- Sophia-Antipolis; It is above all a Research Park, but where start-ups are born regularly, taking profit from the environment and a certain follow-up

For two years the situation has developed very quickly, and the initiatives multiply by taking for model the Israel system, or of the long-lived European incubators like SPINNO with Helsinki and the program TOP in Twente in the Netherlands. Let us describe 3 programs :

1) The MENRT (Ministry for National Education, Research and Technology) launched a call for tender to support the creation of incubation structures related to the higher Education establishments. Approximately 20 projects will be subsidized.

2) CNRS, within the framework of this action, develops a group of incubators, each being created in association with local actors (universities, CEA.). Seven are envisaged; three already started in Grenoble, Lyon, Ile de France Sud (Orsay, Gif, Saclay.). The sites were selected as being able to produce approximately 10 projects per year. Each one is leaned against a body of at least one thousand researchers and professors. Each one comprises a place and a structure of accompaniment. The technological aspects of the project (feasibility, improvement, and targeting product) are generally developed within the laboratory from which Technology results.

Eligible in these incubators are projects of creation presented by the researchers, but also by post-docs, students at the end of their studies, and even entrepreneurs who don't belong to the public research system but who develop its ideas.

3) INRIA, a research organization specialized in Information technologies, pioneered by creating INRIA –Transfert, a few years ago. This "virtual" incubator has no localization, but developed a strong accompanying structure, supported by a dense and active network of "Business mentors".

IV,1,D) Industrial Parks and other accompanying structures in Japan

Actually, if one refers to the definitions given at the beginning of this paragraph, these structures are usually only " industrial parks", sometimes including a nursery; but the Incubation structures, if any, are extremely rare. One can suppose that they will quickly develop within the new TLOs : it never should be forgotten that incubation related to research is essentially a form of the valorization of research (a particularly exciting one!)

Generally speaking, Japanese facilities are very much hardware oriented, like building and test facilities, and lack business support functions and specialists, like marketing, patenting, design, legal, accounting, financing and human resources management. Many so called

"incubation centers" are just low priced rental lab spaces[19]. This is one of the key reasons why Japanese R&D oriented venture business is not well developed in the past 10 to 20 years.

In Japan, there are about 160 so called Science Parks / Research Parks, of which 4O have been created in the last 10 years. Science Parks and "Incubation Centers" (see foot note) are in many cases combined in one place, often located inside Industrial Parks. There are about 10 to 20 major Research Parks in Japan. Following are some of them:

Kyoto Research Park: Combination of TLO, Kousetsushi (Public Engineering Test Center), "Incubator", Entrepreneur Training Center, Research Center and Business Support Center.

Near Kyoto, Osaka

Kawasaki Science Park: Combination of "Incubation Center", Entrepreneur Training Center and Research center. Near Tokyo, Yokohama.

Gifu Softpia Japan: Combination of Industrial Park, research Center, University, "Incubation Center". Near Nagoya.

Hamamatsu Technopolice: Combination of Industrial park, University, Research center and Kousetsushi. Wide area in mid Japan.

Keihanna Plaza: Combination of Industrial Park, University, Research Center and Entrepreneur Training. Near Kyoto, Osaka.

<Kyoto Research Park> (http://www.krp.co.jp English Home Page)

KRP (Kyoto Research Park) is considered as one of the best (His "Incubation Center" is the closest to the definition given above). According to their home page, they cover all the functions which SMEs and start-up companies need, such as Business Consultation, technology Consultation, Financing consultation, Information Service, Human Resources development, Joint Research, Rental Laboratory, Incubation Rental Space, R&D Outsourcing, R&D Subsidy and so on.

One of the facilities in Kyoto Research Park, "Kyoto Prefectural Comprehensive Center for SME for Management & Technology " is proudly declaring in the linked home page ; " we are the only SME supporting organization in Japan who has both Management Department and Technology Department".

"Kyoto Research Park (KRP) is one of the very few fully privatized Science Parks world-wide and very rare in Japan particularly due to its central urban location.

Established in 1987, KRP now houses over 120 tenant companies and research facilities, with about 2000 people based in the 6 hectares of space. More developments are continuing with a final vision of about twice its current size.
40% of the businesses in KRP are in digital multimedia related business.
Other main areas of business include environmental issues and Education -particularly edutainment [20]. KRP is constantly looking to increase the international networks of their

[19] However, for question of convenience, we will keep the name of « Incubation center » when the organizations that we are going to describe are using it.

tenant companies, and are keen to follow up any collaboration or business matching opportunities that may arise.
KRP Corporation manages all the conference facilities within the park, and offers significant assistance in organizing the conference and logistics. Furthermore, a division in KRP is committed to fostering closer links between academia and industry.

Main facilities inside the KRP:

Kyoto Prefectural Comprehensive Center for SME for Management & Technology
Kyoto City Industrial Testing Center (Kousetsushi)
Kansai TLO
Kyoto Industrial Information Center
Kyoto Software Application Center
Kyoto Industry and Technology Development Foundation
Kyoto high technology Foundation
Invention Association

Established : October 1987
Staff : 97

Areas of Business:

1. Rental of office and laboratory space
2. Management of conference facilities
3. Business matching-Industry and Academia, Multimedia
4. Venture enterprise incubation "

<Success Story from the KRP Nursery>

MagMag http://www.mag2.com
from Kyoto Research Park's incubator
Japan's largest internet mail magazine publisher
9,000 daily, weekly, monthly magazines, over 10 million readers
Founded in 1997
Founder:Mr. Koichi Ookawa, 29 years old, Ex Keio Univ. Student
No. of Employee :10 Annual Sales : $5 million

INCS http://www.incs.co.jp
from Kanagawa Science Park's incubator
Rapid Prototyping, 3D CAD Design and Tooling
Founded in 1990 IPO in a few years
Founder: Mr. Shinjirou yamada, 49 years old, Ex Mitsui Metal Co.
No. of Employee: 110 Annual Sales : $30 millions

IV,2) " VALLEYS ":

Everyone, in Europe, in Japan, but also in the United States looks towards " Silicon Valley ". Without going into the details (cf. annexes), one considers that this Valley functions like a system of actors in strong interaction, being strongly dependent upon each other : creators of companies, CEOs, " Business Angels ", venture capitalists, networks of experts, consultants, accountants, lawyers,…Science Parks, TLOs, ..

Many regions or cities try to make their " Valley ", by creating there the conditions of development of such an interactive system. This implies vigorous research centers, voluntary local authorities, a tradition of entrepreneurship, local capitalists accustomed to the taking risk and familiar with technology.

[20] « Edutainment" is a special name forged for Education-entertainment. Kyoto Research Park is focussing on the creation of Education software with a taste of entertainment, so that children can easily learn.

In the United States one can now quote about ten emergent valleys (Boston, Washington area “, Internet alley in New York, Austin, San Diego, Wisconsin…).

IV,2,A) Valleys in France

The political will exists, but not the experience; too many persons in charge are ignorant of the conditions to fulfill to create a “ Valley “ and in particular the need for reaching a critical mass. Only some sites are promising: best currently placed are the South of Ile de France, Grenoble, Sophia-Antipolis, perhaps Lyon, Toulouse... Other sites like Alès – Montpellier have vast projects. The risk is that all one each is persuaded that it can succeed, with the risks of dispersion of public efforts.

<Sophia Antipolis> is an interesting case. As in every “Technopole”, the policy consisted in attracting existing firms, large if possible. It was highly successful : 20000 people, mostly researchers and engineers, are now working in the 1200 companies of this enormous Industrial/Research park, in an area that was before an industrial desert[21]. But it is only recently that the start-up phenomenon was considered as important (while of course, long time ago, some pioneers have created an handful of start-ups).

Typically an Association called “Telecom valley”, founded in1991, is very active in ”attracting new partners, reinforcing international presence through high quality events, encouraging communication and exchanges within and around the park, pioneering the uses of state-of-art Technologies…”. But the interest for a local incubator/nursery is only recent and the opening to venture-capital, business angels and non-technical experts is just starting.

The favorable points are the extreme rapidity of the change of attitude, described as a “tide-wave” ; as well as the international, high tech character of the 1200 companies installed on the site. They form a sound base for the mushrooming of start-ups, of spin-offs from these companies, for attracting venture capital of all forms, and other actors of a valley. But, up to now, it is still just a potential.

IV,2,B) Valleys in Japan

In Japan, there are three well known Venture Valleys. One is “Keihan Valley” in Kyoto/Osaka area (Kei means Kyoto, Han means Osaka), which has a 50 years new technology and manufacturing oriented entrepreneurial venture business experience. The other two (“Shibuya Bit Valley” in Shibuya Area of Tokyo, and “Sapporo valley” in Sapporo City Area in Hokkaido) gather information technology (IT) / Internet oriented entrepreneurial venture businesses.

The characteristics of Valleys is the integration of various functional specialists and facilities allowing very rapid face to face contacts.

<Keihan Valley>

Keihan Valley needs to shift from a 50 years Electronics industry oriented Valley to IT / Internet / Electronics integrated industry Valley, with younger generation involvement. The core of the Keihan Valley is Kyoto. The **Kyoto model** is often cited by foreign newspapers and magazines (Business Week may 31,1999 – Japan’s high-Tech hope Kyoto’ dynamic companies may create Japan’s version of Silicon valley)(Chart 11) ; this model is highlighted

[21] Favorable circumstances have been the climate, the French policy of decentralisation and the charismatic figure of Pierre Laffitte.

with the following characteristics of business management style (“Kyoto Model” by A.Ishikawa, K Tanaka 1999) :

1. Strong Founders Leadership
2. Small and Flat Organization
3. Innovation Focused Human Resources Management
4. Extremely Strong Cost Consciousness
5. Consumer Market Focused R&D
6. High Level of Manufacturing Technology
7. High Utilization of Stock Market
8. Contribution to the Local Society

Close contact with university research center and professors, close face to face networking, global mind for both marketing and technology collaboration, Internet and IT technology introduction are the factors which were combined to the Kyoto Model, creating Keihan Valley dynamism.

In Kyoto, Kyocera, Rohm, Murata, Nidec, Horiba, Nichicon, Sanyo Chemical, Nintendo, Omron, Samco, and in Osaka, Keyence, Megachips are the key companies of the Keihan Valley, and majorities are venture companies of decades ago. And in Kyoto area about 300 new high tech venture companies are emerging and 10% or so might make IPO in a few years, they say.

Following are the recent successful high tech venture companies in Keihan Valley.
<Successful Venture in Keihin Valley>

Megachips (Osaka) http://www.megachips.co.jp
Image handling System LSI Design, Sales , Fabless
Founded in 1990, IPO in 1998,
Founder: Mr. Masahiro Shindo,
57years old, Ex Mitsubishi Electric Co.
No. of Employee : 90 Annual Sales : $60 million

Samco International (Kyoto) http://dev.fablink.com/samco
http://www.jpcanet.or.jp/show99/ku-sa/014.htm
Thin film and Plasma technology oriented research co.
Founded in 1979, IPO in a few years,
Founder : Osamu Tsuji, 57 years old, Ex NASA researcher
No.of Employee : 100 Annual sales : $33 million
Research Center in Silicon Valley in 1987

<Shibuya Bit Valley>

At one of the hottest spots for fashionable young people in Tokyo, a population of digital technology specialists started to gather in 1997 for information exchange. They are university students, entrepreneurs, consultants, Foreign company’s employees, Researchers, Ex big company’s employees, graduates from US MBA, etc.

Currently over 300 members are forming “Bit Valley Association” for information exchange meeting over a beer, and about 50 venture companies are located in this valley area. Majority of them are Internet related businesses. Many subsidiaries of US Internet related venture companies, like Yahoo-Japan, Microsoft-Japan, AOL-Japan, SGI-Japan are located in this valley, too. Many IPO are expected from this area in this year and in the next few

years. Women's start-ups are very active, too. As Shibuya is in the center of Tokyo, almost all facilities are easy to access face to face[22].

Following venture companies are so far successful and becoming well known:

<Successful Ventures in Shibuya Bit Valley>
Rakuten http://www.rakuten.co.jp
Web Shopping Center, with over 1500 shops was founded in 1997, by Mr. Hiroshi Mikitani, 35 years old, ex JIB Bank M&A specialist. He is one of the heroes of the day of Internet venture business in Japan. He is currently starting a "net auction business". IPO is expected in a few years.

Future System http://www.future-us.com
Network System Integration consulting company. Founded in 1989, IPO in 1999. No. of employee: 150, Annual sales amount : $40 million. The well known "Seven Eleven convenience store" IT network system is being developed by this company.

Digital Garage http://digital.garage.co.jp
Net Age http://www.netage.co.jp
Interque http://www.interq.ad.jp
Dennoutai http://www.dennotai.co.jp

IV,3) PATENTING AND LICENSING

Usually the future of start-ups is protected by patents[23]. It is thus necessary to tackle this subject here.

IV,3,A) Nature of the patents:

It is well known that the European and Japanese patents on one hand and the American patent on the other hand have different bases. The American researchers have one advantage: the priority of the invention does not belong to the one who is first to deposit a patent, but to the one who proves that he was the first to invent. To publish is thus not incompatible with patenting and the researcher has one year after the publication to deposit a patent (the so-called "délai de grâce"). The authorities of the Commission are aware of the problem (cf. the green book of the innovation).

Table 4 gives some comparative data.

IV,3,B) Patents coming from university (and public) research

In the context of this study, it seems interesting to look further into the situation of patents registered by the researchers.

[22] Recent editing note : Quite comparable to Shibuya Bit Valley are the New York Internet Valley and quite recently but explosively growing the Internet "Sentier" in the very center of Paris.

[23] A notable exception being the sector of Information technologies for which other types of protection have been developed.

The American reference:

Very precise statistics are available about the number and the evolution of the patents and licenses stemming from the American universities. They are provided by the AUTUMN, Association of the American University TLO (Technology Licensing Offices). The most significant data are provided by Table 3. They are absolutely impressive as well by their amount as by the speed of growth: 10000 patents disclosed, 4733 patents filed, 2741 licenses sold in 1996, compared with 7300 disclosures, 2900 applications and 1700 licenses sold in 1992. On the other hand it is estimated that 250.000 patent related new jobs were created in 1997. Stanford University and California State University's license fee jumped from less than $1 million to $40 – 60 million per year in these 15 years. (Chart 12), etc.

The origin of this success is allotted to " Bayh-Dole Act ". This law was deposited in 1980 then reinforced by successive decrees. As a clear result of this law, the universities themselves took the responsibility and the benefit of the patents. It is in particular the case when the research was made within the framework of contracts financed by a company. This one can receive an exclusive license but it does not own the patent (even in joint ownership)[24].

Taking the opportunity of this law, the American universities set up **very professional TLOs**. The biggest ones employ from 10 to 20 experts (lawyers, engineers, scientists) and manage very important portfolios. As an example let us quote the annual average results of the University's of Wisconsin TLO: 200 patent disclosures, 150 patent deposits, and 120 licenses. However the majority of the universities are satisfied with a staff of 2 to 5 people but they rely on specialized firms such as RCT and BTG

Patenting and licensing in French academic research

French university and para-academic (CNRS, INSERM, "Grandes Ecoles"...) laboratories would file 2500 patents if they reached the American effectiveness. In fact:

- The largest producers of public patents are the CEA (200 patents) and IFP (French Petroleum Institute) (150 patents), but these two organizations are not para-academic.
- For academic research, the largest organization for the patents and licenses is FIST, subsidiary to 70% of CNRS (and to 30 % of the ANVAR); FIST examines 160 patent applications, 85 of them being registered and places 60 licenses per year. FIST was created in 1992 and took over one office of ANVAR that had fulfilled this role since 1970. FIST takes care of patents presented by CNRS own laboratories and university laboratories associated with CNRS (on the whole 1.300 research teams).
- Some French universities have their own office of patents, in general very small. By adding their results to those of FIST, one can advance the figures of 130 patent disclosures, 100 deposits and 70 licenses. I.e. this total production is inferior to that of the University of Wisconsin alone. It is 10 times lower in relative value to that of the American universities.

One can suggest some explanations:

- Initially one thinks initially of the lack of enthusiasm of the academics and French researchers to file patents. Nobody really encourages them to; in any case not the evaluation committees that generally do not take into account patents filed by the researcher in the evaluation of his merits. However the system of remuneration of the

[24] Other factors related to the social environment change contributed to this favorable evolution : end of the cold war, reduction of the military budget, severe world market competition, change of the industrial structure and positive use of outsourcing, universities' activity to develop patents and to transfer to private companies through collaboration research were highly promoted since 1980

public inventor is as generous in France as in the United States: 25 % for the inventor, 25% for the laboratory, the remainder for the institutions and the TLO.

- But the principal cause of this poor performance is a tradition which was established twenty years ago: to support the multiplication of University-Industry contracts, the persons in charge of research centers and universities agreed that the patents would be owned by the company. It is the case for at least 150 patents per year[25], that should be added to the 100 already quoted.

The situation would be different if the university and French para-academic system adopted rules similar to those of Bayh-Dole Act. In fact the French law does not impose anything and each organization has its own policy. The CEA, for example, has always applied the American rule. CNRS recently decided to align itself with this position and it is renegotiating its framework agreements with Large Companies, but change will take time. Universities still have a very lax policy, keen of getting more resources from contracts.

Patenting and licensing in Japanese academic research

In order to promote R&D related venture business, patenting and licensing by universities and research centers are key items. There are two big issues to be solved in Japan, which are related to the status of the national universities and their professors

a) **First, some facts :**

In 1997, there were only 139 patents registered in Japanese universities[26] (compared to 2,200 in US) : Tokai Univ.: 13, Tokyo Institute of Technology: 11, Nagoya Univ.: 11, Tokyo Univ.: 5, Waseda Univ.: 5, Kinki Univ.: 5, Tohoku Univ.: 4, Kyoto Univ.: 3, Osaka Univ.: 3. Japanese universities' license revenue was $0.3 million compared to US $272 million. In Japan, out of over 10 thousand patents so far registered as national asset, only 600 have been utilized in private companies, gaining $3 million license fee per year, and the majority of over 10 thousand patents are sleeping as dead stocks.

This situation is not acceptable :"Japan has many researchers in universities (240,000 people; over 1/3 of 670,000 researchers in the whole nation), and a large amount of research funds is used in universities (over 1/5 of total public and private R&D expenditure) where potentially lucrative research results are expected. It is important to make use of such potential by increasing technology transfer from universities to private companies. This may bring about new business creation and activation of Japanese economy." This message is from an official MITI's paper. But the actual situation is as mentioned, with very few patents coming from universities in Japan.

Two key reasons for this poor patent situation in Japan :

- One reason is that in university, patents are not at all taken into account for evaluation and promotion of researchers / professors. The number of academic papers is the most important factor.
- The other reason is that in Japan national universities'[27] patents belong to inventors, and not to universities like in US. Professors do not like the troublesome and costly

[25] By way of comparison the two French companies which produce the largest number patents, Alcatel and l'Oréal, file approximately 600 patents per year..

[26] This represents 0,04 % of the annual 330.000 Japanese patents

[27] The majority of University R&D budget is distributed to national universities.

registration and maintenance of patents. The majority of patent ideas or rights are given to friendly private companies or ignored.

b) TLO's in Japan

In August 1998, a new Act was passed : "The law promoting technology transfer from universities to industry in Japan". This new law helps the establishment of Technology Licensing Organization (TLO), which handle patents filing, marketing, and licensing on behalf of university researchers. Based on this law, about 12 TLOs have been approved, up to now, by MITI and Monbusho . And 10 to 15 more should be established in a year or so. Once approved as TLOs, they will get two advantages. One is financial support : about $0.2 million per year for 5 years. The other is the exemption from annual maintenance charges for keeping the patent.

List of approved TLOs:

CASTI (Center for Advanced Science and Technology Incubation, Ltd.)
---- Tokyo University
Kansai TLO Co. Ltd. ---- Kyoto University, Ritsumeikan University etc

Tohoku Techno Arch Co. Ltd. ---- Tohoku University etc

Nihon university Business Incubation Center ---- Nihon University

Institute of Tsukuba Liaison Co. Ltd.

Waseda University External Liaison Office

Tokyo Institute of Technology

Keio Intellectual Property Center --- Keio University

Yamaguchi University .

JST's role in patenting : JST (Japan Science and Technology Corporation), within STA, has a function to support University professors and public researchers to file patents, with very favorable conditions. Troublesome registration tasks are done by JST staff and all the initial registration charges will be deducted from possible future license fees. The patent rights go to JST, but once the actual accumulated expenses are paid back, the patent right can be returned to the inventor of the patent.

c) Adaptation to Japan of the « Bayh-Dole Act »

In July 1998 (??), a so called "Japanese version of Bayh-Dole Act" was registered. From now on, the patent rights will belong to the inventor and no longer to the government[28]. The University's TLO may be in charge of filing, managing and promoting the patent.

The law we have just mentioned (July 1998) focuses mainly on patent rights of individual inventors in universities, so it remains substantially different from the US Bayh-Dole system, which squarely places both the authority and the incentives to conduct effective technology transfer on universities (see above).

d **) University – industry relations**

[28] Exceptions to this rule can be decided by an ad hoc committee at the University level.

The remaining issue is how universities will take patents into account for the evaluation of university researchers.

More generally it is the whole attitude of universities towards companies that has to be changed. There was a "golden age", before the war and in the fifties, when the cooperation was strong and even world famous. For some reasons, including the students riots against industry/university cooperation, this linkage became very loose (except for the hiring of students by companies, where professors have kept a decisive role).

If this attitude remains as it is today, all these positive laws will not change anything for R&D oriented venture business creation in Japan.

IV,4) REGULATORY ASPECTS:

IV,4,A) Practical problems

In France as in Japan a candidate entrepreneur must face many administrative problems to create his company[29]. They are often described as an important barrier, able to discourage those who are only half-convinced.

In the recent French law on innovation (July 99), some improvements were introduced (for example a "simplified status" for starting firms (Sociétés anonymes simplifiées).

IV,4,B) Tax Policy in Japan

As a venture business support, "Angel Tax" (see § III,4,A,d) and "Stock Options" are the most critically important items. A few years ago, after a long discussion, Japan decided to install both of these tax systems. However because of many limitations imposed by the Ministry of Finance, they are not well utilized, and not yet efficient to trigger venture business promotion in Japan.
It is a new demonstration of the Japanese "Item by item return" subsidy approach, described about the SBIR Business model (see § III,5,C) ; the impact of the public aid system is finally weak because of a too conservative attitude, that considers the return item by item and not globally. Thanks to strong proposals by industrial societies and SMEA-MITI efforts, these situations are gradually improving, but very slowly compared to the rapidly changing entrepreneurial business environment.

IV,4,C) Stock Options in Japan

In November 1995, the Stock Options System was first installed in Japan but only for start-ups / venture companies and with many limitations.
In June 1997, this Stock Options System was extended to cover all companies including big companies. However, because of tight limitations and inflexibility, few companies are applying this system

In November 1999, at the so called "SME (Small and Medium Enterprise) Promotion Congress" (see §II,1,A), distribution of stock options is extended to people outside the company, like venture capitalists, consultants, accountants, mentors, angels, etc, who are

[29] One will further treat the authorization given to public researchers to participate in the creation of a company

supporting the company, and of course even these outsiders must clear many conditions to be approved.

Further deregulation of the stock options system is needed to come close to the very flexible US stock options system, which allows stock options distribution even to students and subsidiaries. Another problem is the ceiling applied to the favorable capital gain tax rate[30] ($100,000 per person, per year, for the stock purchase). As a consequence, $10,000 to $20,000 is the maximum gain obtained from risky hard work thanks to stock options, and not millions of dollar like in US. Indeed this is not an efficient weapon to boost venture spirits. The reputation of the current stock options system in Japan is terrible. Mr. Masayoshi Son, CEO of Soft Bank and Mr. Nobuyuki Idei, CEO of Sony are openly criticizing it and push to a drastic improvement as soon as possible.

[30] 26% instead of 32%.

V) PEOPLE : LACK OF ENTREPRENEURS

V,1) CULTURAL ASPECTS

One comes to the third bottleneck. Even if the investors look out for good projects; even if plenty of good ideas germinate here and there, and particularly in contact with research; even if there is profusion of incubation structures; even then, there will be few creations if one lacks men and women who have the taste to undertake, who agree to take the risk to create their company.

Unfortunately France and Japan have lost somewhat their culture of entrepreneurship. The Education system, in particular at the level of the Universities and the Engineering schools, pushes on the contrary towards employment in large companies and public administration. It was not always thus; in any case the authorities have become aware of this phenomenon and are taking measures that will be described.

But this could change rapidly. The “Internet tide” is revealing that a significant fraction of the new generation has a strong entrepreneurial spirit : start-ups are mushrooming ; the media present them as the new heroes. Of course it is too early to say if it will be a lasting phenomenon and if this change will reach older people.

V,2) STRUCTURES FOR TEACHING ENTREPRENEURSHIP:

Public opinion has little sympathy for the entrepreneurs, still regarding them rather as future exploiters than like creators of employment. And, in addition, failures are the subject of conversation (severely!), rather than successes. Of course, the persistence of unemployment slowly modifies this opinion, but only the educational system can accelerate a reversal of this tendency.

V,2,A) At the primary school and the college:

At this level, certain countries like Scotland and Austria obtain spectacular successes. An increasing fraction of the children there have the opportunity, sooner or later, to participate in a fictitious project of creation.

In France nothing like this does exist; as a preliminary we must start by changing the state of mind of those who train the teachers. Let us report however experimental initiatives at the lycée level (“entreprises cadettes”…)

In Japan the government is seriously discussing how to create a national positive consciousness to entrepreneurial spirits, and not worry too much about failure. Entrepreneurial spirit Education in elementary schools is officially discussed among government staff.

V,2,B) On the contrary at the level of higher Education the things change very rapidly.

Teaching entrepreneurship in France,

Two successive reports, commissioned by the Minister of Industry then by the Minister for Education, recommend the massive development of the formation to entrepreneurship. This can take two forms: the participation in projects of creation : the formal teaching of the management of the creation of companies.

Three years ago, this teaching existed in a complete form only in one place: the Lyon Business School, and in a more marginal way in four or five other places.

Today the situation is rapidly improving. A recent investigation inventoried more than one hundred entrepreneurship courses. The specialists are gathered in an " Academy of Entrepeneurship ".

Let us particularly point out the coordinated efforts of the " Ecoles des mines (generalist engineers) " and " Ecoles des télécommunications". On this subject, their leader is " L'Ecole des Mines d'Alès", whose teaching program is now centered on the training of future entrepreneurs. The ambitious objective of these schools is that the proportion of their engineers who will create sooner or later a company, will triple from 6 to 20 percent. For the other students, the formation thus delivered should better prepare them for the functions of project leaders and heads of companies.

Teaching entrepreneurship in Japan

Until two or three years ago, there were almost no entrepreneurship related lectures or courses in Japanese universities. However in 1998, there are about 50 universities who carry entrepreneurship related lectures, and in 1999 it is about 80 universities. Including those who have plans to set up entrepreneurship lectures, the number goes up to about 190. And about 5 of them have a specialized courses for entrepreneurship development in graduate or under graduate courses. There will soon be over 200 universities with entrepreneurship lectures

Following are major universities who have courses or lectures for entrepreneurship development:

Keio University : MBA Entrepreneur School at outside of campus in Tokyo
Kouchi Univ. of Technology : Graduate School of Entrepreneur Engineering
Tokyo, Osaka and Kochi, using TV conference system
Only on Saturday & Sunday for Business People purpose
Ritsumeikan Univ. : Undergraduate Course of Entrepreneur in Kyoto
Dedicated Day and Night Course
Jyousai International Univ. : Undergraduate and graduate course
Waswda University : Graduate Course with Entrepreneur Lectures
Housei University : Graduate Course of Entrepreneur
Specialized Day and Night Course
Doushisha University : Graduate Course with Entrepreneur Lectures
Sannou University : Graduate Course with Entrepreneur Lectures

Compared to US, who has over 500 universities with entrepreneurship lectures or courses, Japan needs to improve curriculum and content of lectures, and needs to increase the number of experienced professors. And it would be better if they were involved in the ongoing venture environment, to guide students with both live venture experiences and academic venture logic. It would help to develop an academic theory of entrepreneurship. In Japan about 50 faculty members are involved in the venture business operations. 15 faculty members in Ehime University, 8 in Osaka Universities, and 4 in Kanazawa University of Technology and so on.

Following are some examples of professors involved in venture business:
Prof. Sachio Senmoto , Keio University : Wind Mill Co., Internet Co.
Prof. Akihiro Okumura, Keio Univ. Medical Inf.
Prof. Isao Shirakawa, Osaka Univ. System LSI design
Prof. Akio Hiraki, Kochi Univ. of Technology : Diamond Thin Film Display
Prof. Tadayoshi Asada, Kyoto University : new type LCD
Prof. Masao Sakauchi, Tokyo university : Multi Crystal Silicon
Prof. Junichirou Yagi, Tohoku University : Disposal Process Consaltation

. Another necessary change is a drastic reorganization of the old faculty structure and attitude, to fit an entrepreneurial environment (see above).

Let us recall (see above § III,4,B) that six universities have set up venture funds jointly with venture capital or financing companies, and that 35 universities have plans to establish university funds to invest in start-ups in which they are involved.

V,2,C) Training of the candidates entrepreneurs:

A persistent idea consists in denying that adequate training can increase the chances of success in the creation of companies. In the same way, it was not so long ago that, in the universities and the Engineering schools, it was claimed that management was learned on the job. One is now convinced of the opposite, in particular because of the success of the Canadians and the Americans in terms of formation to entrepreneurship. This is why the majority of the incubators now introduce this formation like one of the major services offered to the candidate-entrepreneurs.

In France

Let us quote " Challenge plus " at HEC (A famous French Business School), which organizes two sessions per year, each one of about 20 candidate-entrepreneurs. Courses to make the doctorants more sensitive to entrepreneurship are also given in the neighboring universities (Orsay, Ecole Supérieure d'Electricité, Ecole Polytechnique…). Most of lectures are given by professional experts (accountants, venture-capitalists, entrepreneurs, lawyers, etc…)

In Japan

Some systematic trials of internship of candidate entrepreneurs in venture firms are already starting in Japan. Many students have the intention to have their first job in a venture firm in order to have some training being an independent entrepreneur in the near future.

V,3) THE PROBLEM OF PUBLIC RESEARCHERS AND PROFESSORS:

Throughout this report we have paid particular attention to the companies created by public researchers (including by university professors). They are few of them, but their role is qualitatively important for psychological reasons. For example it would not be possible to promote the "research related start-ups" as an important means of technology transfer, nor to develop incubators close to the universities, if the researchers and professors did not have the authorization to take part in the creation of those companies. This however was the case in France until the adoption of a new law in July 1999.

The French case: a new law

The professors and the majority of the public researchers (CNRS, INSERM, INRA,...) are civil servants. Therefore they belong to the "public function" of which one of the major principles is that civil servants cannot draw any personal benefit from the work which they achieve for the government. It was necessary to derogate from this principle. It took three years to negotiate this exception near the administrations of the Public office and Finances, then to convince the members of Parliament. It was done in July 1999. The new law envisages two cases:

A) The researcher decides to give up his position in public research and to take a direct responsibility in the creation and management of the start-up.
B) The researcher keeps his position in public research but he agrees to take part in the success of the start-up, as consultant and/or shareholder. This is authorized there, provided that his participation in the capital does not exceed 15 %.

The Japanese case ; Limitations to the collaboration of Public Researchers and Professors with Industry

Public officers in Japan are severely prohibited by law to have side work in private companies.
These limitations to the public researchers and professors activities are a weak point of Japanese venture promotion. Collaboration between university and venture firms and creation of spin-offs by university researchers are one of the critical key factors to boost venture business. For example in US the collaboration is dynamic, and in Germany many so called "An-Institute" (installed "on the other side of the street") and professors' side jobs at "Fraunhofer Institutes" are very efficient tools for university/industry collaboration.

Fortunately some changes have been made in the last 2or3 years, because they are considered as good for increasing national competitiveness :

- Since April 1997, national university professors are allowed to have side jobs in private companies under conditions: to work as a researcher or as a research leader.
- National university researchers or professors can be a board member of a private company if the company is using technologies~~,~~ which the professor developed..
- At the same time, to be an auditor of private company is also allowed.

But in early 1999, Prof. Iwao Nakatani, Hitotsubashi University, strongly proposed to have a side job as an outside board member of Sony Corporation. After lots of arguments, in Nov. 1999, the decision came, the answer was no.

National research institute researchers are treated the same way as national university researchers and professors.

Private university professors are free from these restrictions, of course. Unlike national universities, professors have good contacts with private companies, But in Japan, the majority of public R&D budget goes to national universities and national research centers, and very little of the budget goes to private universities.

In brief, University-Industry cooperation would rapidly contribute to the development of new industry and new venture businesses if private universities had a larger share of R&D public money, and if national universities had more freedom. It is being considered that national universities become independent agencies, an enormous change from the current non independent organization without legal entity.

VI)CONCLUSIONS AND RECOMMANDATIONS

The prime purpose of developing start ups is to create new industries and, as a result, to create new employment. And it should be in line with the trend of the Third Wave, utilizing information technologies. We know that the level of basic technology in France and Japan is extremely high in the world. And we know the High Tech start-ups have a strong impact to create new industry and employment. In France and Japan, it is especially necessary to connect high technologies to the development of new start-up systems, such as bio industry, electronic key devices industry, information technology industry, communication industry, micro machinery industry, optical electronics and communication industry, environment industry and so on.

Compared to the US, however, Japan and France are much behind in developing High Tech related start-ups. It is worthwhile for Japan and France to jointly study the bottlenecks limiting the development of high tech start-ups, comparing the entrepreneurial infrastructure and supporting policies. The key factors for success in High Tech start up are very different from the key factors for success in the low tech and service oriented start-ups.

The three obstacles we pointed out in this report, 1) Money: lack of capital venture, 2) Projects: lack of credible start-ups, 3) People: lack of entrepreneurs, are to be tackled by governments through concrete supporting policies with clear targets. Government should not be involved in the details to foster entrepreneur business, but strategy and basic infrastructure are needed to be restructured by the government.

This study suggests quite a variety of measures that appeared to be successful in either Japan or France or in the United States. We emphasize the importance of the “valleys”, i.e. of places where all the factors of success are combined. Quite decisive also is the role of the “gazelles”, i.e. very rapidly growing start-ups : they represent a model, a reference, and a strong encouragement for all venture business actors.

Due to their similar problems in this domain, Japan and France can be good partners to compete in the entrepreneur race, and it is worth continuing exchanges of information as well as some cooperation between the principal actors of the venture business system (Venture capital, incubators...).

APPENDICES

Chart-1 **Venture History Japan v.s. US**

Japan	***U S***
• **1958 Keio Univ. Established**	• **1891 Stanford Univ. Established**
• **1935 Matsushita Established**	• **1939 HP Established**
• **1946 SONY Established**	• **1946 First VCC (ARD)Est'ed**
• **1963 SME Basic Law Installed**	• **1951 Stanford Research Park**
• **1972 First VCC (KED) Est'ed**	• **1953 SME Law Installed**
• **1976 TENTONew Market Opened**	• **1957 DEC Established**
• **1981 SoftBank Established**	• **1958 SBIC System Installed**
• **1982 First Investment Fund**	• **1968 Intel Established**
• **1982 First Incubator KSP Est'd**	• **1968 World First Investm't Fund**
• **1987 Kyoto Research Park Est'd**	• **1971 Silicon Valley become active**
• **1995 Stock Option Installed**	• **1971 NASDAQ Started**
• **1996 Local SME Support,45Co.**	• **1975 Micro Soft Established**
• **1997 Nat'l Univ. Prof.Side Job ok**	• **1979 Pension Fund/ERISA Act**
• **1997 Angel Tax Installed**	• **1980 Bayh-Dole Act Installed**
• **1998 TLO Law Installed**	• **1983 SBIR System Started**
• **1999 SBIR-Japan System started**	• **1986 President Reagan Tax Cut**
• **1999 Bayh-Dole Act-Japan**	• **1986 Federal Tech. Transfer Act**
• **1999 MOTHERS New Market**	• **1996 Yahoo Establised**
• **2000 NASDAQ-Japan New Market**	• **2000 AOL Merged Time-Warner**

Chart-2

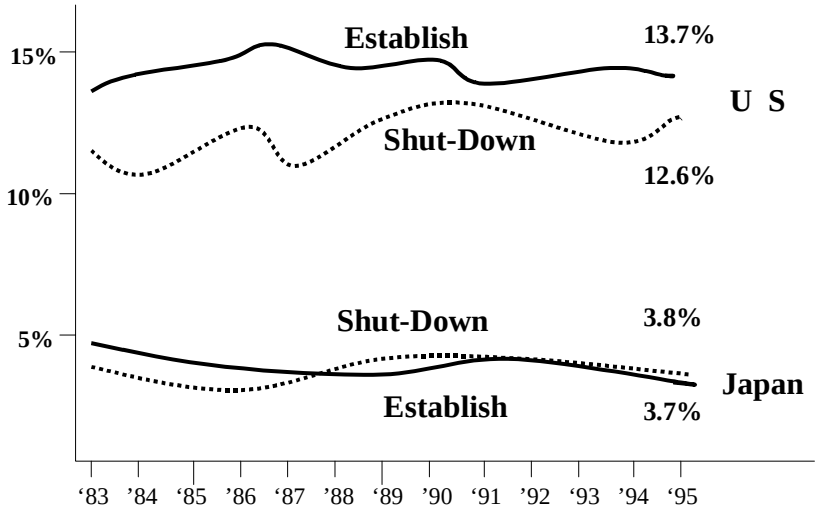
Entrepreneurial Comparison *Japan v.s. US*

	Japan	*U S*
Years to IPO	• 30years(5 to 60)	• 5years(2 to 10)
No.of IPO/Y	• 100(15 to 200)	• 500(150 to 800)
Age of Founder at IPO	• about 50	• about 30
Share of Founder at IPO	• about 70%	• about 4%
Firm Establish %	• 4%	• 14%
Firm Shut-down %	• 4%	• 13%
SME New Employment	• 90,000	• 1,500,000
Stock Option	• $ 0.02 million	• Millions $
Exit Strategy	• My company	• IPO, M&A etc
Bankruptcy	• End of Life	• Good Lessons
Min Fund to Est. Ltd	• $ 100,000	• $ 0
No.of Univ.Entre Course	• 50	• 500
Univ./Co. Collaboration	• Few	• Many

Chart-3

Firms "Establishment, Shut-Down" Ratio

Image Chart



Data from Japan SME White Paper 1999

Chart 4

No. of IPO in Japan

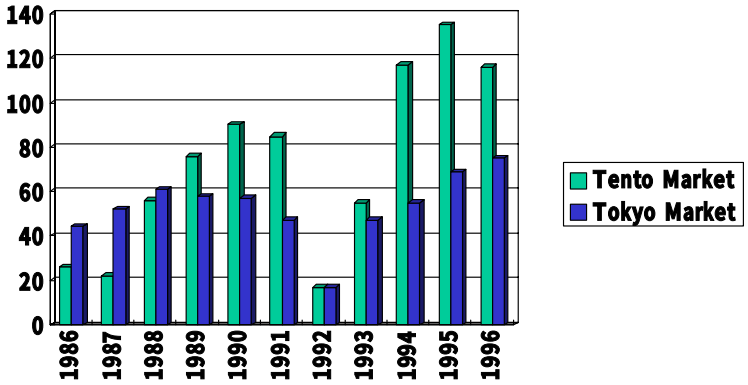


Chart-5 " NEW MARKET " in Japan

Rough Comparison of Required Conditions

	TENTO	MOTHERS		NASDAQ-Japan
Start	**1976**	**Dec. 1999**		**Jun. 2000**
Profit	**None**	**None**		**$ 0.7 Mill. NPBT**
Asset	**None**	**None**	**or**	**$ 4 Mill.**
Market Value	**$ 5 Mill.**	**$ 5 Mill.**		**$50 Mill.**
No.of Stock Holder	**300**	**300**		**300**
Years since Est.	**Less than 10**	**None**		**Over 1 Year**
Stock Liquidity	**Float Stock 30% or 500KPublic**	**1,000Public at IPO**		**Float Stock 1000**

Chart-6

US - Japan Stock Market Comparison

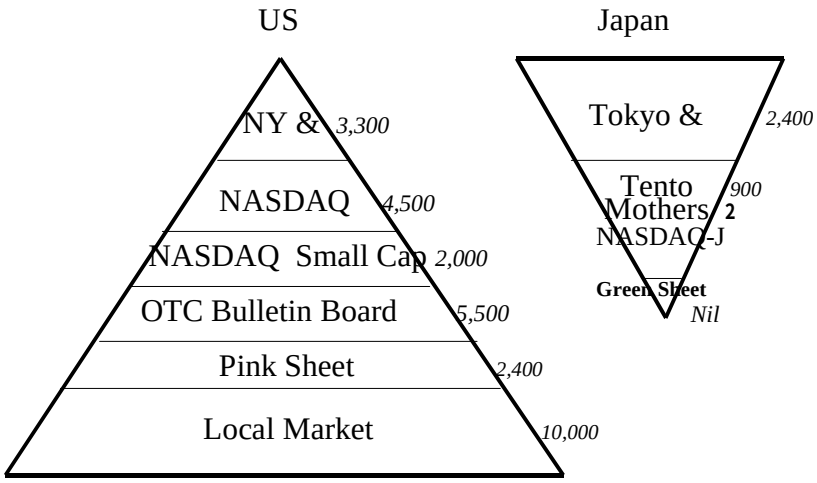


Chart-7

No. of Venture Capital Co. Established in Japan

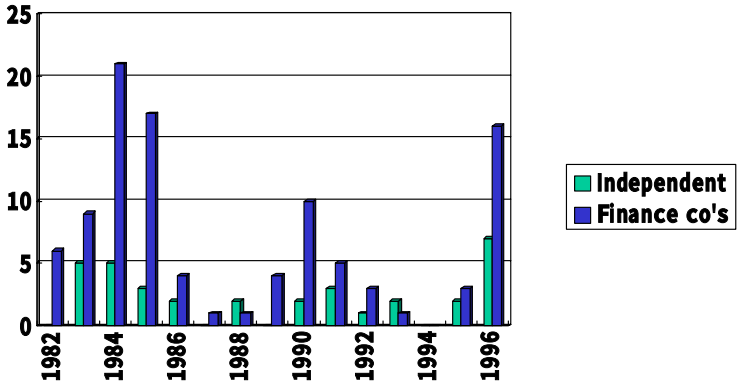


Chart-8

“ ANGEL TAX ” Japan VS US

	Japan	US
Object Co.	**R&D Oriented SME**	**ALL SME**
Capital Gain	**75% Nontaxable** **within 1 Year of IPO** **(Started Nov.'99)**	**50% Nontaxable** **after 5 Years of Investment** **Tax Carry over** **if Re-Invest within 60days**
Capital Loss	**Capital Gain Marge** **for 3 years**	**Regular Income Marge** **up to $50K. $3K Carry Over/Y**
Living Dead	**No support of tax**	**can count as Capital Loss**

Chart-9

U S

Entrepreneur Business Model

Dynamic Cycle of Risk Fund

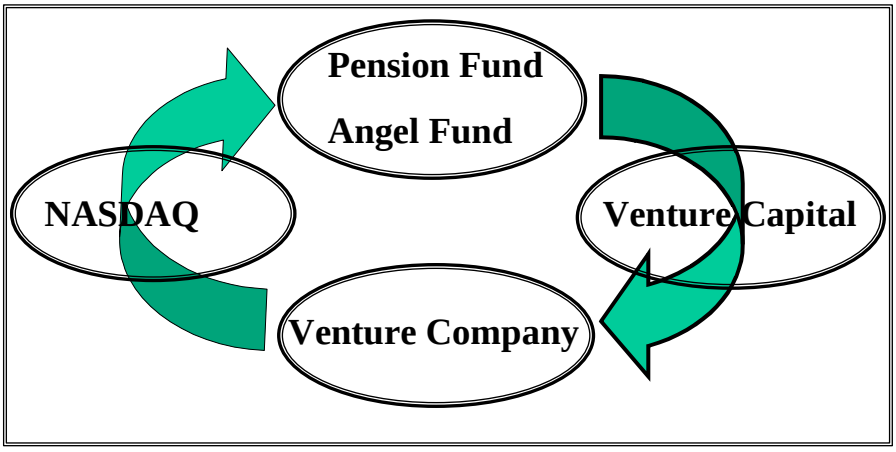


Chart-10

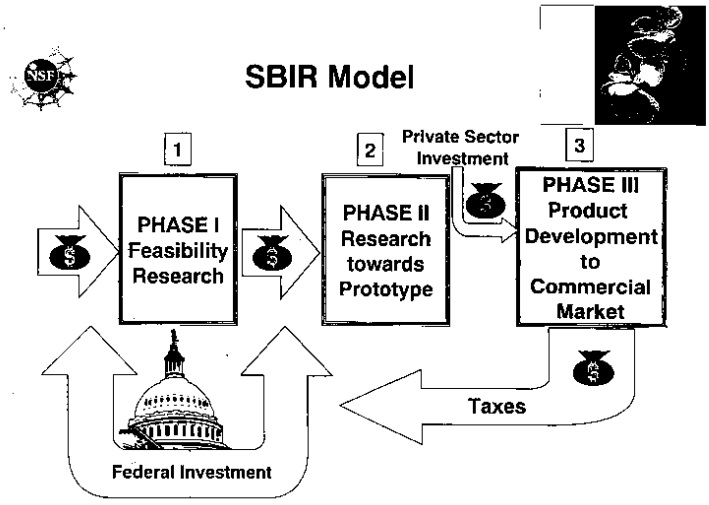
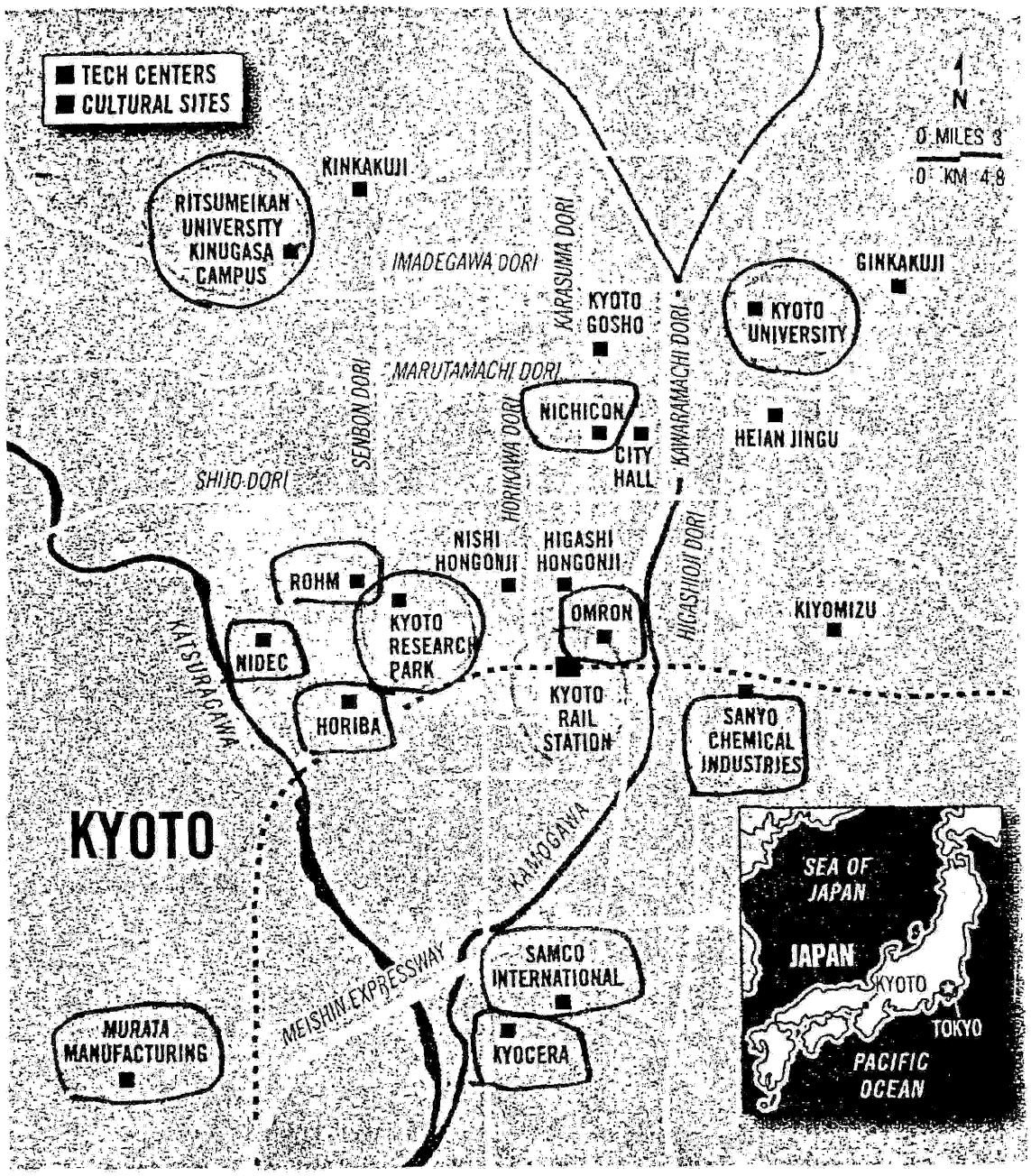

SBIR Model
1
2
3
Private Sector Investment
PHASE I Feasibility Research
PHASE II Research towards Prototype
PHASE III Product Development to Commercial Market
Taxes
Federal Investment

Chart 11-1


WHO LEADS HONG KONG? / AMERICA'S SPY SATELLITES
BusinessWeek
EBAY VS. AMAZON
A DEFINING MOMENT FOR E-COMMERCE
ASIAN EDITION / MAY 31, 1999
A PUBLICATION OF THE McGRAW-HILL COMPANIES
JAPAN'S HIGH-TECH HOPE
Surprise! Kyoto's small, dynamic companies may create Japan's version of Silicon Valley

Chart 11-2

A CITY RICH IN HISTORY AND LEGEND



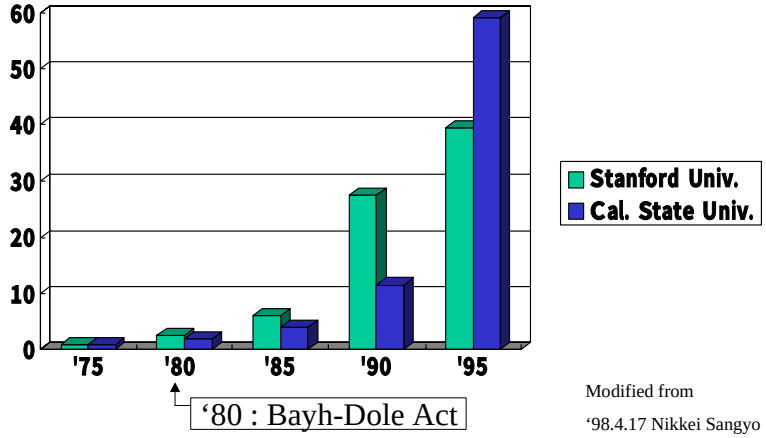
Kyoto's Vanguard

Chart-12

License Fee of Univ.

with Tech.Transfer

$ in Mill



Modified from
'98.4.17 Nikkei Sangyo

Appendix 1

Robert Chabbal
De: Mustar Philippe [mustar@paris.ensmp.fr]
Envoyé: mercredi 31 mai 2000 13:08
À: Robert Chabbal
Objet: entreprises créées par les chercheurs

Cher Robert,

Voici un texte qui reprend le petit exposé quej'avais préparé pour Maeda.
Je vous laisse couper tout ce qui ne parait pas pertinent.
Amitiés

Philippe

Depuis le milieu des années 1980, plusieurs centaines de chercheurs et d'enseignants-chercheurs de nos universités, grandes écoles ou organismes de recherche (CNRS, CEA, INRIAŠ) ont créé leur propre entreprise dans les domaines des biotechnologies, de l'intelligence artificielle, des technologies de l'information et des télécommunications. J'ai suivi la trajectoire de plus de 300 de ces sociétés de haute technologie issues des laboratoires publics de recherche. L'analyse dynamique de la création et du développement de ces PME a apporté deux résultats inattendus. Le premier concerne le taux de survie de ces entreprises : six ans en moyenne après leur création, les trois quarts d'entre elles existent toujours. Le quart restant se partage entre les entreprises qui ont totalement disparues et celles qui ont été reprises par une autre (ce qui ne peut être considéré comme un échec puisque les technologies, les produits, les compétences demeurent mais se développent dans un autre cadre). Le taux d'échec est donc très faible comparé à celui existant dans le secteur de l'industrie et des services où une entreprise sur deux disparaît dans les cinq ans qui suivent sa création. Le second résultat touche à la création d'emplois : en moyenne, trois ans après leur création ces entreprises comptent une douzaine de salariés et, après six ans, une vingtaine. Pour évaluer l'importance de cette effectif, il faut la rapporter à la taille moyenne des entreprises nouvellement créées en France : cinq années après leur création, les entreprises de l'industrie et des services comptent en moyenne trois ou quatre salariés. Les entreprises créées par des scientifiques sont donc, en moyenne, largement plus créatrices d'emplois. On rencontre peu de " success stories " , mais dix pour cent de ces entreprises ont aujourd'hui entre 50 et 250 salariés.

Toutes choses égales par ailleurs, les performances économiques de cette population de PME sont plutôt bonnes comparées à celles des entreprises en général. Comment expliquer cette relative réussite ? N'est-il pas étrange que ceux que l'on présente généralement sous les traits des professeurs Nimbus ou Tournesol réussissent ? Pour lever ce paradoxe, je m'intéresserai à la trentaine d'entreprises qui, sur les 300, ont connu la plus forte croissance et essayant de mettre an avant ce qui a différencié leur stratégie de celles des autres. En définitive, la question à laquelle voudrait répondre cet article est : pourquoi certaines firmes de haute technologie connaissent une forte croissance alors que d'autres restent petites ou disparaissent ?

L'argument que je vais développer dans ce qui suit est que la condition de succès de ces entreprises réside dans leur capacité à créer des partenariats et des alliances avec des acteurs variés. On est loin de l'image mythique de l'entrepreneur héroïque et solitaire. Seuls, et quelque soit leurs talents, les entrepreneurs de la haute technologie ne peuvent rien : pour réussir - c'est-à-dire pour créer simultanément une organisation (la nouvelle entreprise), ses produits et ses marchés - ils ont besoin d'être enchâssés dans des réseaux de relations interactives et des partenariats avec des acteurs diversifiés.

LES PARTENARIATS MULTIPLES

Ces partenariats sont de plusieurs ordres. Ils sont financiers. La création et le développement d'une PME a un coût. Qui le supporte ? La capacité des entrepreneurs à convaincre divers acteurs d'investir dans leur projet est cruciale. Fonds personnels, capital familial ou de proximité, sociétés financières et de capital-risque, investissement d'autres entreprisesŠ les sources financières sont hétérogènes. Mais une est commune à toutes les entreprises de forte croissance : les soutiens publics. Les aides à l'innovation de l'ANVAR, le crédit d'impôt en faveur de la recherche, les soutiens des collectivités locales ou des programmes technologiques européensŠ ont été déterminants dans la réussite des projets. Nos statistiques soulignent le rôle moteur joué par ces financements publics. Ce sont eux qui permettent l'émergence et les premiers développements de l'entreprise. Une large partie de la dynamique de la firme est assurée par ses liens avec les institutions publiques.

Les PME qui ont connu les plus fortes croissance ont également pour point commun d'avoir engagé dès leur création des partenariats dans le domaine de la technologie et de l'innovation. Ces partenariats se développent dans le cadre de projets technologiques, c'est-à-dire qu'ils sont centrés sur l'élaboration de nouvelles compétences et de nouveaux savoir-faire. Là, ils mêlent autour de projets communs, l'entreprise, ses fournisseurs mais aussi parfois ses concurrents. Les programmes technologiques européens sont de bons exemples de ces réseaux qui ne visent pas directement la réalisation de produits commercialisables mais qui cherchent plutôt à développer les compétences nécessaires à la réalisation de nouveaux produits ou services et qui sont la clé des avantages compétitifs de l'entreprise à moyen terme. Les partenariats sont également nombreux dans le cadre de projets industriels, c'est-à-dire de projets tournés vers des objectifs commerciaux. Là, l'entreprise collabore avec d'autres firmes, non plus seulement dans le cadre de relations de sous-traitance, mais de plus en plus souvent pour co-développer des produits nouveaux. Ces alliances tournés vers le marché se tissent avec des fournisseurs mais également avec des clients dont la présence, au fur et à mesure que l'on se rapproche du marché devient indispensable.

Dans ces entreprises de haute technologie il n'est en effet pas rare de rencontrer les clients. Les responsables de l'entreprise savent que consulter le futur client, à travers des études de marché par exemple, pour saisir ses besoins n'est pas suffisant. Pour des produits radicalement nouveaux : il faut admettre que le client ne sait pas exactement ce qu'il désire ! Les entreprises les plus performantes ont mis en place des systèmes sophistiqués de relations avec leurs futurs clients pour la définition et la conception des produits nouveaux ; mais aussi pour le suivi de l'usage qu'ils en font. Plusieurs cas ont montré l'intérêt de suivre la façon dont les clients utilisaient les produits qu'ils avaient achetés. Une veille technologique se développe ainsi non pas auprès les concurrents - elle est toujours utile - mais chez quelques clients particulièrement innovateurs dans les usages qu'ils font des produits de l'entreprise. Certains clients sont en effet particulièrement inventifs et vont imaginer de nouveaux usages au logiciel ou à l'appareil qui leur a été livré, usages non prévus par leurs concepteurs. Il est important de répertorier ces utilisations, ces nouvelles fonctionnalités et de les réintroduire dans ses nouvelles générations de produit. Ces partenariats touchent également aux aspects commerciaux, à la distribution des produits tant pour élargir leur réseau de distribution national que leur pénétration sur des marchés étrangers.

RESEAUX INTERNATIONAUX

La science est par nature internationale : les produits de haute technologie proposés par les entreprises créées par les chercheurs visent généralement un marché mondial. D'ailleurs, une entreprise sur deux réalise une partie de son chiffre d'affaires à l'exportation. Malgré leur très jeune âge, ces entreprises savent intéresser des clients à l'étranger. Celles qui sont le mieux dotées en capital créent très vite au moins une filiale aux Etats-Unis, les autres y accèdent en s'engageant dans une alliance. Ainsi, telle PME de biotechnologie s'est associée - dans le cadre d'un projet Eurêka - à une entreprise du nord de l'Europe pour développer des kits à base d'anticorps monoclonaux. Cette coopération a donné à l'entreprise française l'accès au réseau de distribution international et lui a permis d'accéder à des marchés outre-Atlantique. L'internationalisation concerne également la finance et l'actionnariat. Quelques-unes de ces performantes PMI sont récemment rentrées sur le

Nasdaq américain. D'autres sont devenues des filiales de grandes entreprises, souvent américaines, de la pharmacie ou de l'informatique. Enfin, ces entreprises collaborent généralement dans le domaine de la recherche avec des laboratoires de plusieurs pays ; et recrutent aussi leurs cadres scientifiques, gestionnaires ou commerciaux à travers le monde.

LABORATOIRE ET ENTREPRISE

Les partenariats concernent enfin les liens avec la recherche académique. Les entreprises créées par les chercheurs ont pour base les connaissances mises au point et les compétences développées dans les laboratoires publics. Une fois créée, l'entreprise doit elle " couper son cordon ombilical " avec la recherche ? Notre suivi de plus de 300 cas, montre que les entreprises qui ont connu les développements les plus importants sont celles qui non seulement ont gardé des liens très étroits avec leur laboratoire d'origine mais qui dans le même mouvement ont multiplié leurs relations avec d'autres laboratoires. Elles disposent en interne d'une équipe de recherche qui comprend des chercheurs en formation. Elles emploient des scientifiques de renom comme consultant quelques jours par mois. Elles sont engagées dans des accords de coopérations dans le domaine de la R-D dans le cadre de contrats européens par exemple. Les chercheurs des entreprises les plus performantes de notre population continuent à présenter des communications dans des colloques scientifique et signent des articles dans les revues scientifiques. Cette capacité d'exploration de la science en train se faire augmente leurs chances d'avoir des idées inédites, de saisir de nouvelles possibilités de croissance.

COOPERATION ET ORGANISATION

En définitive les firmes créées par les chercheurs sont à la fois très proches de leurs clients - qui participent à la conception de leurs produits et services - et très proches de la recherche. Elles réalisent un travail d'adaptation permanent et d'allers et retours entre la science et le marché. Mais ce processus est loin d'être linéaire : le modèle qui séparait ceux qui conçoivent des connaissances, ceux qui élaborent des produits, ceux qui les commercialisent et ceux qui les utilisent ou les achètent est ici périmé. Il est remplacé par un modèle plus interactif qui mêle les genres et qui donne une forte importance aux partenariats. Ce sont ces partenariats qui donnent à l'entreprise sa capacité d'anticipation, sa capacité stratégique d'analyse des technologies et des clients. Dans le même mouvement, ils lui permettent de mobiliser et d'accumuler les ressources et les compétences variées que réclame son développement. Gérer l'innovation dans la PMI de haute-technologie, revient alors à gérer ces réseaux d'acteurs diversifiés que nous venons de décrire, réseaux qui sont autant externes qu'internes à l'entreprise. Les chercheurs-créateurs d'entreprise qui ont particulièrement réussi ont rarement créé l'entreprise seuls. Ils se sont entourés de professionnels du management, de la finance et de la commercialisation des produits de haute technologie. Leur société est elle même organisée en réseau, elle fait communiquer et collaborer étroitement ses différents métiers. Un problème de gestion crucial concerne alors l'indispensable équilibre entre les nécessaires partenariats décrits ci-dessus et une intégration stratégique qui doit permettre de garder le cap, d'éviter la dispersion. C'est la gestion par projet - facilitée par la petite taille de ces entreprises - qui permet de maîtriser à la fois les choix stratégiques et les réseaux de partenariat.

De quelle façon les entreprises que nous avons étudiées ont-elles mis en place et définies leurs choix stratégiques ? La stratégie de la petite entreprise de haute-technologie n'a pas l'harmonie classique d'un jardin à la française avec ses parterres disposés de façon symétrique sur un terrain plat, ses belles allées toutes droites bordées de buis, ses massifs réguliers aux couleurs assorties, ses statues et ses jets d'eau géométriquement installés. Dans la quasi-totalité des entreprises observées la stratégie n'est pas explicitement formulée au départ. Elle n'est pas réglée à l'avance. La stratégie émerge progressivement au fil des rencontres et des négociations de l'entreprise avec d'autres acteurs, elle se définit en même temps que les décisions se prennent, elle se construit petit à petit, pas à pas au fur et à mesure que l'entreprise elle-même se construit. Certes un plan d'affaires et des études de marché existent, mais les limites de tels exercices dans des situations où tant les technologies que les marchés sont incertains sont bien connues. Cela ne veut pas dire qu'il faille

abandonner les plans d'affaires ou les études de marché. Bien sûr, ils sont nécessaires, ils fournissent un cadre à l'action, ils obligent à poser les idées, les points forts et les faiblesses sur le papier, à les discuter, à les amenderŠ mais il faut savoir qu'une fois le plan d'affaires établi, une fois l'étude de marché réalisée, une fois l'entreprise juridiquement créée tout reste à faireŠ Cette situation n'a rien de pathologique, elle est au contraire normale, ordinaire même pour ces entreprises. Le reconnaître implique que toutes les décisions comptent, qu'il n'y a pas de petites ou de grandes décisions, qu'elles sont toutes stratégiques : tenir un stand dans tel salon, recruter un commercial plutôt qu'un ingénieur, choisir tel fournisseur plutôt que tel autre, accepter un jeune ingénieur pour son stage de fin de scolarité, contacter telle agence publique pour obtenir une aideŠ Il est important pour les créateurs de l'entreprise d'admettre cette réalité, d'admettre qu'à chaque fois qu'ils opèrent des choix, la trajectoire technologique de l'entreprise peut-être modifiée. L'entreprise en formation est très sensible à ces modifications de trajectoire, à l'imprévuŠ sa stratégie ne doit pas fuir cette incertitude, elle doit au contraire accorder sa place au désordre.

CHERCHEUR ET ENTREPRENEUR

Le mot " stratégie " est-il bien adapté aux chercheurs ? Certainement pas si l'on considère que les scientifiques sont des professeurs Nimbus (il suffit de voir comment ils sont représentés dans la presse). Mais si l'on pousse la porte des laboratoires, et que l'on comprend que le travail de recherche est un travail d'équipe, que près d'un laboratoire sur trois a des liens avec l'industrie, que la dialectique coopération/compétition est au c¦ur de la profession de chercheur (les scientifiques coopèrent, échangent leurs résultats mais dans le même temps ils sont concurrents pour l'obtention de postes, de budgets, de locaux, pour attirer vers eux les jeunes les plus prometteursŠ), que le travail de remise en cause y est permanentŠ on met alors à mal l'image du savant fou. Les qualités du chercheur et de l'entrepreneur ne sont plus aussi éloignées qu'on l'imaginait a priori. Pour choisir ses thèmes de recherche et les équipes avec lesquelles collaborer dans des domaines où la concurrence est ardue, pour se remettre en cause en fonction des résultats apportés par d'autres, pour gérer son laboratoire et recruter de nouveaux chercheursŠ les scientifiques doivent être de fins stratèges. Cela n'étonnera pas les historiens et les sociologues des sciences qui savent que les scientifiques depuis Pasteur ont toujours été des stratèges de premier ordre. En définitive, l'analyse de la trajectoire sur plusieurs années de la population quasi-exhaustive des entreprises créées par des chercheurs en France a montré que la réussite de leur projet passait par la mobilisation et l'accumulation de ressources et de compétences variées. Nous soutiendrons l'idée que pour la PME technologique, la gestion de l'innovation est synonyme de gestion d'alliances et de réseaux composés d'acteurs diversifiés. Mettre en place une organisation interne qui permette de tirer parti au mieux des coopérations avec l'extérieur devient alors une des clés du succès. De nombreux travaux, nous suggèrent que ces enseignements peuvent être étendus à des entreprises plus anciennes, plus importantes ou moins tournées vers la haute technologie.

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October 1999

Transformation of Japanese Enterprises' Strength Through a New Business Model

A proposal for achieving Science and Technology Based Industry Building in Japan

Noboru MAEDA

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Technology (NISTEP), Science and Technology Agency, Japan

The Japanese business model for success, the so-called "Catch Up Model," is no longer effective in the information technology age of today. Yet it appears as though no one—the government, corporations, or the Japanese people—knows what the new direction should be for businesses in Japan.

On the other hand, companies in the U.S. are taking advantage of E-business with the successful Silicon Valley business model. Big companies are enjoying high profit ratios, due in large part to corporate restructuring, concentration of business domains, significant layoffs, and mergers and acquisitions.

The European switch to the common currency of the Euro is triggering a restructuring of business and of business culture. The impact of the new common currency to the European economy appears to be greater than expected.

There is no doubt that both E-business and the Euro will continue to be strong economic forces for both U.S. and Europe for the next 30 to 50 years. In order to vitalize the Japanese economy in the coming decades, we need to determine what new economic model should replace the current catch-up model in Japan. (Chart 1)

Historically, Japan has followed the U.S. with regard to business models, including such approaches as the business unit system of Jigyobu, international operation, globalization, the division company system, and more.

The manufacturing industry was the exception, and Japan developed several unique business technologies in that industry, including KAIZEN, Operational improvements, just-in-time or KANBAN, nil parts inventories, TQC, Total Quality Control, and others.

However, after observing these technologies and learning from the experiences in Japan, the U.S. was able to improve on the Japanese operational improvement capability by including information technology in the approach. Just-in-time is now called SCM; TQC is now called Six Sigma, and Japanese enterprises are importing these technologies from the U.S. to use in the manufacturing industry. (Chart 2)

Chart 1

BUSINESS MODEL

	OLD	NEW	Keyword
US	Large Co. →	Silicon Valley Model GE Portfolio Model	*Net Economy*
EUROPE	National →	Pan Euro Model	*EURO Money*
Japan	Kaizen Model →	?	?

Chart 2

Manufacturing : JAPAN < USA

JAPAN 1980s				*USA 1990s*
JIT KANBAN	+	IT	=	SCM
TQC KAIZEN	+	IT	=	Six Sigma

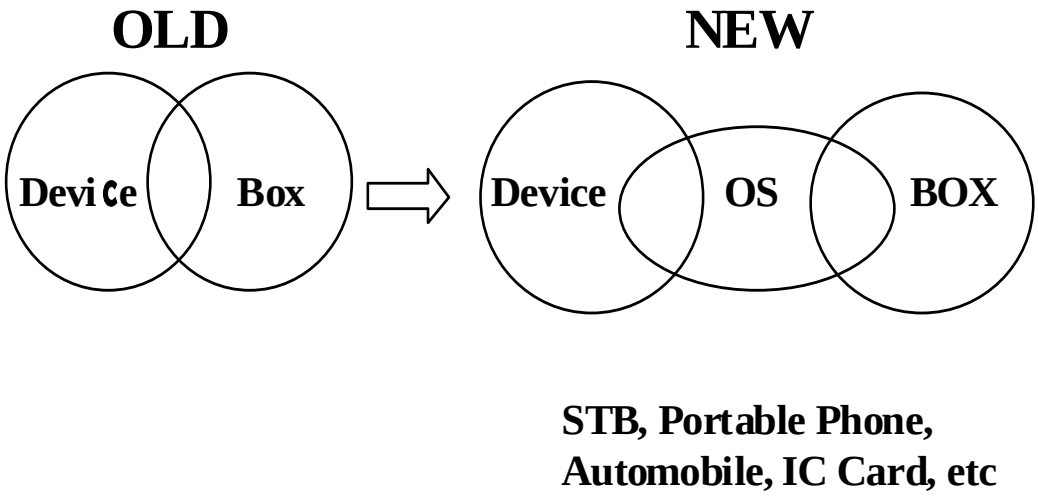
⇨ US Exceeded Japan in Manufacturing

However, Japan is still very strong in the device industry, including LCD, DVD, Battery, System LSI, KANAGATA, molding, and so on. The U.S. imports significantly from Japan in this industry. This enables companies in the U.S. to save time in the assembly of manufacturing merchandise. In the past, these key devices and box terminals have formed a Two-Circle Model.

But in this age of information technology, these key devices will become useless unless they are built with operating systems (OS) that can communicate with networks—in other words, be part of E-business. This business model—combining OS with the devices—can be called the Manufacturing Three-Circle Model. (Chart 3)

Chart 3

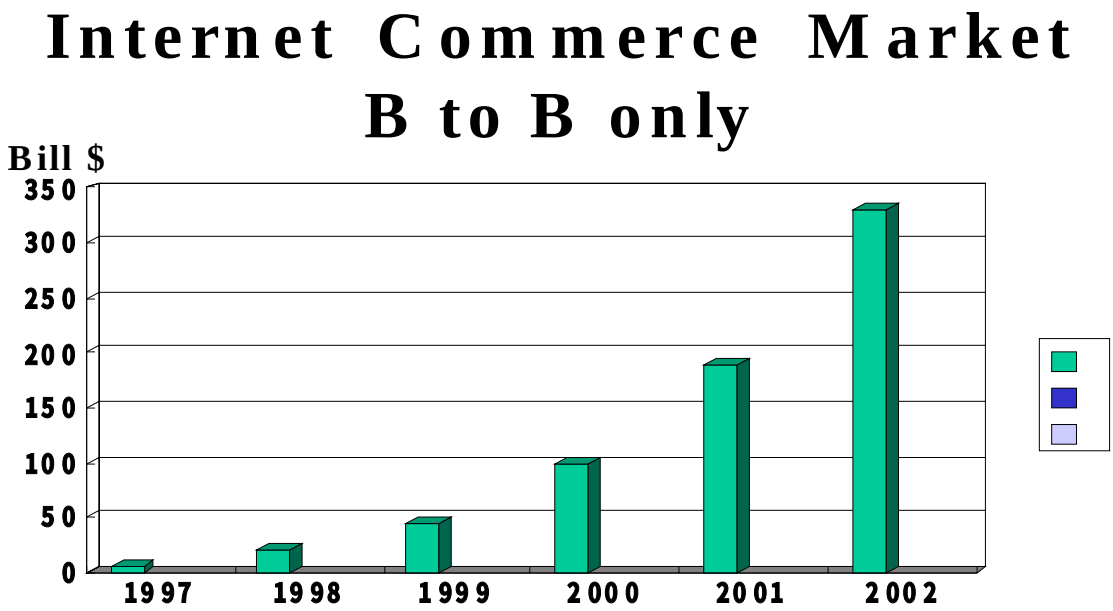
Manufacturing Business Model



As the famous futurist, Alvin Toffler predicted in his book, the Third Wave, in 1980, the information and knowledge society is already taking over the industrial society, and information-related services and knowledge businesses are starting to dominate the world market. One U.S. research company is forecasting a dramatic increase of network service business over the next four years. (Chart 4)

GE Medical, once a manufacturing company of medical image diagnostic systems, now earns most of its profit primarily from network services, including remote maintenance and repair. The same is true of the GE Airplane Engine Division Company. Instead of manufacturing, these companies now utilize core engineering technology and products to generate revenue from their core technology-related services and software businesses. Their business domain has become service for the user of the manufactured products.

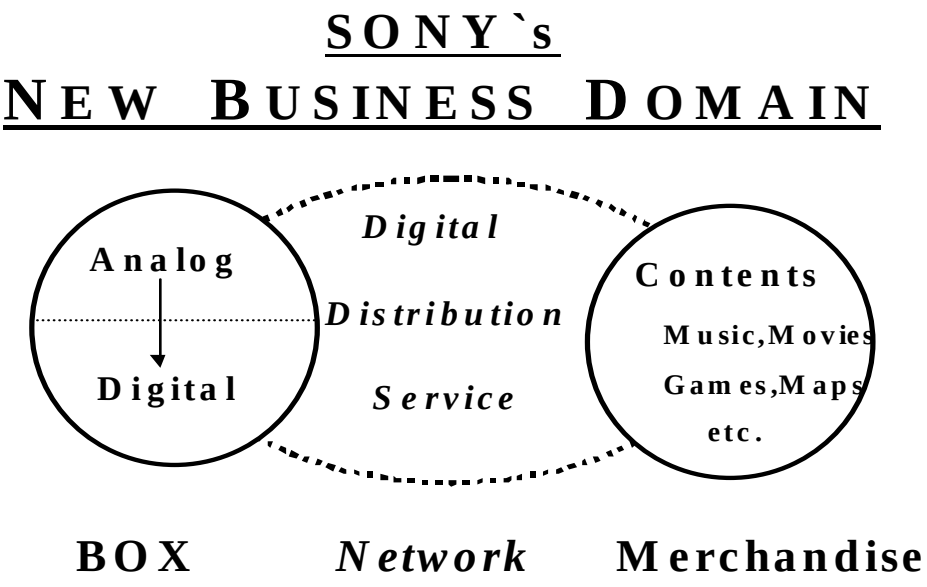
Chart 4



Forester Research ,US 1998

Leading manufacturing companies in Japan, like Sony and Toyota, are trying to build a new business domain in this network economy age. With strong sales in consumer equipment (televisions, video recorders, and game machines) as well as content (music, movies, and game software), Sony is developing a network business model. This model can be called the Network Three-Circle Model. (Chart 5)

Chart 5

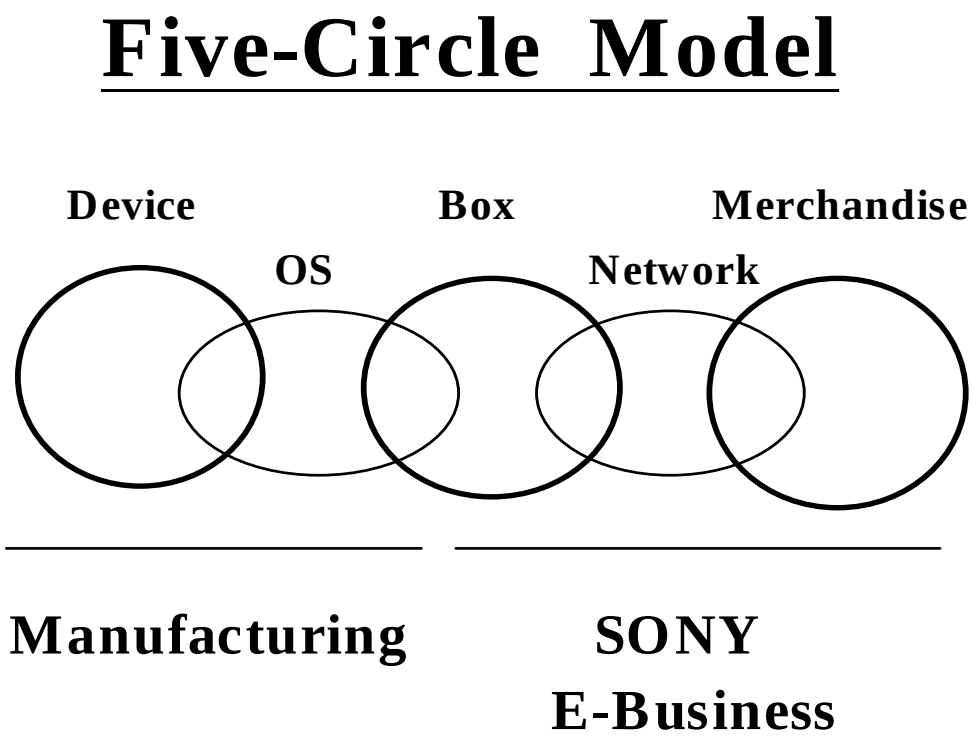


Sony is changing from an audio/video equipment manufacturing company to an entertainment service company.

Toyota's Three-Circle Model is essentially the same as Sony's. The company is using the concept of the Intelligent Transport System to change from an automobile manufacturer to a service company for customers who buy Toyota automobiles.

The U.S. is more advanced than Japan in many areas related to network business, such as cable TV, communication satellites, routers, the Internet, network shopping, and so on. This is the current business model in the U.S. Are companies like Sony and Toyota catching up? The answer is no. However, Japan is in a good position to utilize its strength, the Manufacturing Three-Circle Model, to get into the network business. The Manufacturing Three-Circle Model and the Network Three-Circle Model can be combined to make a Five-Circle Model. (Chart 6)

Chart 6



The Five-Circle Model is a chain of rings: DEVICE, OS, TERMINAL BOX, NETWORK, and MERCHANDISE.

By integrating key devices with an OS, a company can maintain strong leadership in organizing the network structure. WINTEL is a good example. MPU by Intel and WINDOWS OS by Microsoft are also examples of products that have had a strong impact on the emerging use of personal computers (PC) for Internet E-business.

The personal computer, however, is no longer the leader in the current wave of consumer-related business. The PC is not suitable for consumer use. Consumers don't want to wait 30 seconds to start up their terminals or computers. They want to be able to shop immediately after they push the start button. Some consumers prefer to do their network shopping through a cell phone or from their automobiles.

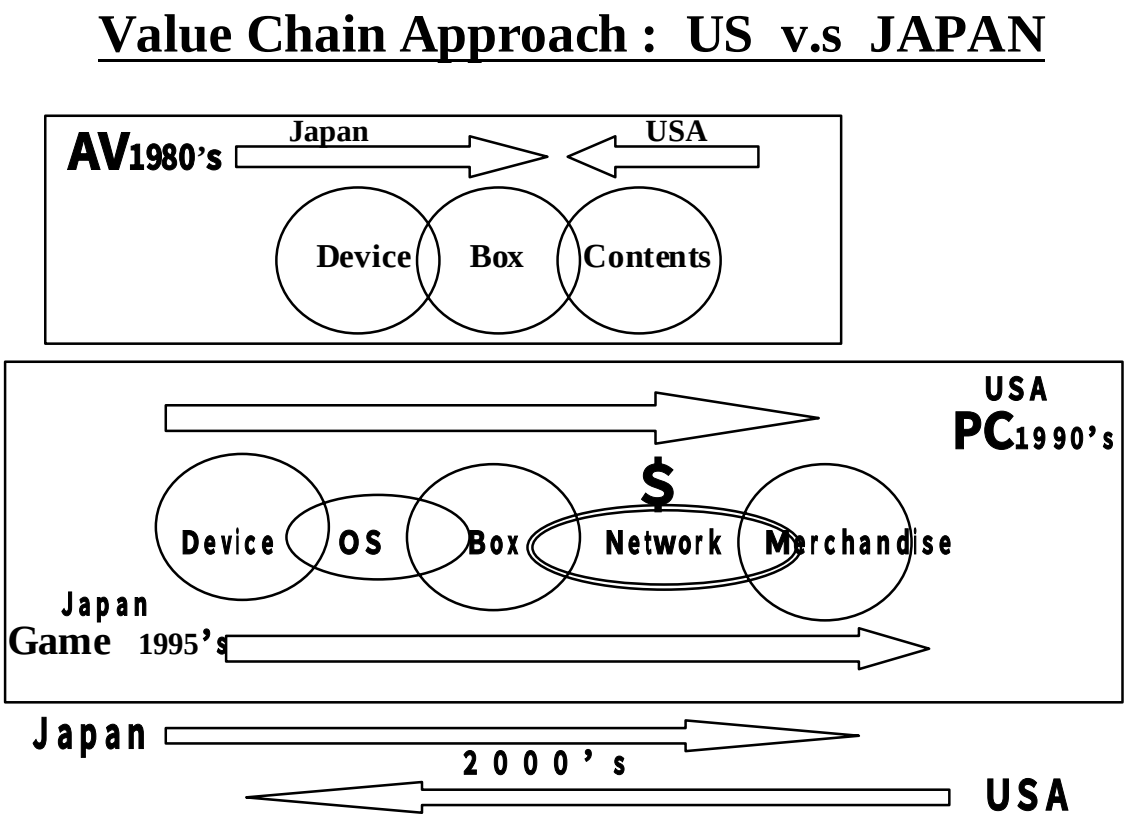
Windows CE, the Microsoft OS for consumer terminals, is too heavy for consumer equipment. Nokia, Erikson, and Motorola are jointly developing a new OS with a UK start-up company for the next-generation cell phone. GM, Ford, Toyota, and DaimlerChrysler are developing their own navigation equipment OS. They know that if they were to utilize Wintel's OS and devices, the majority of the profit would go to Wintel.

Sony and Matsushita are developing their own OS for home-use Set Top Box (STB). Sony is already shipping millions of STB with their own OS, called APERIOS, for U.S. CATV use. When Sony announced the second-generation computer game machine, Play-Station II, Sony's CEO Mr. Idei indicated that the company was now ready to surpass Wintel. With the ability to sell 70 million game machines worldwide in four years, Sony can invest billions of dollars to develop 3D image-processing LSI, system LSI, and OS, which will far exceed the performance of the Pentium II and be ready for network operation. Game machines are the closest thing to home terminals for the network economy in the near future. These LSI and OS could be utilized for other consumer multimedia needs as well.

In the network age, the most influential factor of the Five-Circle Value Chain is the key device and the OS it contains. PCs and game machines have been and will continue to be evidence of this.

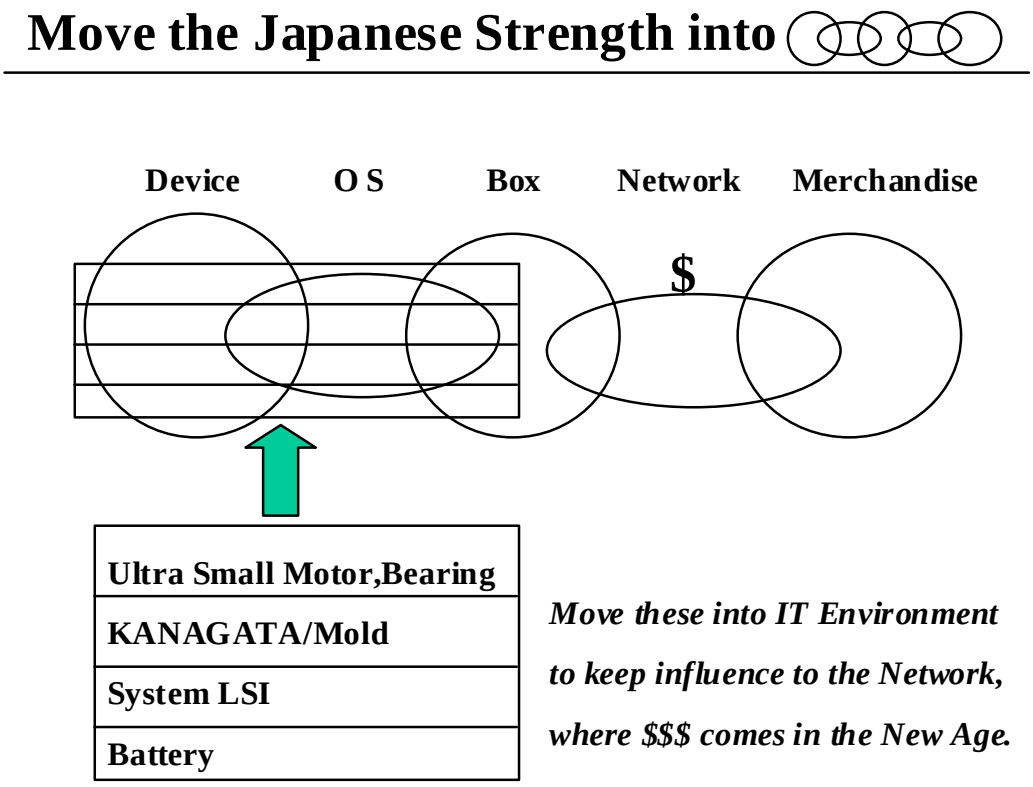
In the U.S., as the network economy continues to grow rapidly, the emphasis in the Five-Circle Value Chain is on service (right side of the chain), not on the device (left side of the chain). If Japan could also approach the model from the device side, that could ultimately prove to be the successful way of obtaining value from the network economy value chain. (Chart 7)

Chart 7



In order to take advantage of the full value of the Five-Circle Model, Japanese device manufactures need to add information technology to their existing analog technology and move their business domain into the Five-Circle Value Chain. (Chart 8)

Chart 8



Another issue for Japanese companies is organizational flexibility. In order to make the different elements in the five circles work together most efficiently, each module of the organization must be autonomous. The leader of each organization module should focus on finding the strongest combination of elements. That person should also be an expert in that field.

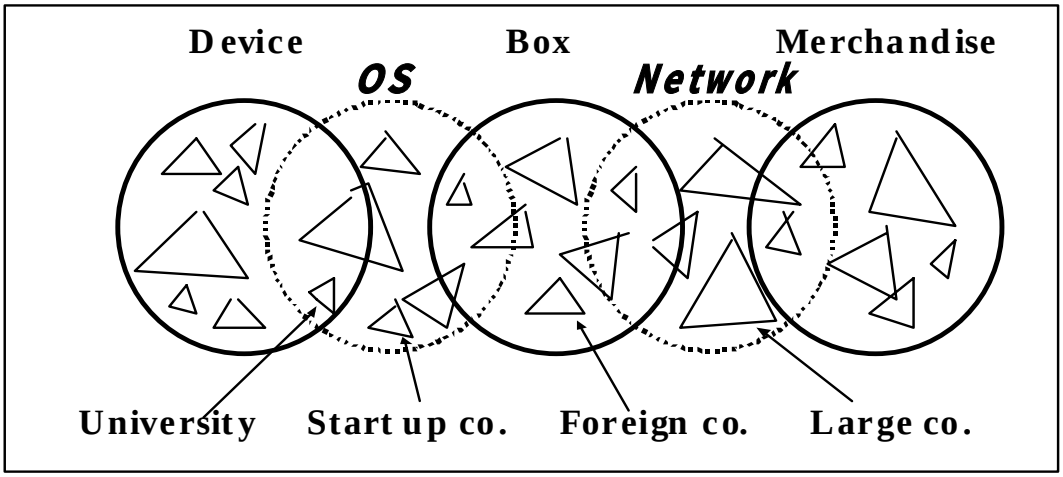
In the high-speed IT network business environment, the leader of a small module, such as a division or section of a big organization, must be able to make the appropriate decisions, or the combinations will fail. Big corporations need to change their corporate culture so that small divisions of the organization are free to search for the best combinations within the Five-Circle Model. Start-up companies, universities, foreign companies, government research centers, and organizations in other countries or in different industries should also be considered as candidates for combination or partnership. (Chart 9)

As the economist, Joseph Schumpeter, defined in 1912 in his book, The Theory of Economic Development, Innovation comes from the "Neuer Kombinationen", New Combination. The concept is still alive today.

Recently we have seen many examples of combinations of big companies and start-ups. A start-up company is now considered to be an equal partner to the big company and not merely a vendor, as in years past. Sometimes the start-up company leads the big company into the Five-Circle Value Chain. (Chart 10)

Chart 9

Dynamic Module Combination



⇨ **Small Independent Organization is the Key.**

Chart 10

New Waves in Japan

Technology Oriented Entrepreneur

Company	Founded	Founder	Business	Joint work with:
• IIJ	'98	Suzuki	B to B Network	SONY, Toyota
• INCS	'90	Yamada	Mold Tooling	HONDA
• Yozan	'90	Takatori	LSI	NTT
• Future	'89	Kanamaru	System Design	Seven Eleven
• Mega Chips	'90	Shindo	System LSI	Nintendo
• Thein	'92	Iizuka	System LSI	AV Makers
• Synthesis	'98	Yoshida	System LSI	Sumitomo Denko
• Kyouden	'83	Hashimoto	Print Board	AV Makers

⟹ **Utilize Big Companies as Equal Partners.**

Big Japanese companies are now more eager to form these types of partnerships with foreign start-ups in Silicon Valley and Europe. (Chart 11)

Chart 11

Combination of
Japanese Big Co. And Foreign Start up

NTT	US Autowave	CAD Design on line service	M&A
HITACHI	US EDW	Digital Virtual Image	Joint Research
	US Concept Five	IT Data Manage	Get Licence
SHARP	US Nuvomedia	Internet Distribution	Tech.Alliance
SHIMAZU	UK Nordico	Thin Film	M&A
SONY	US Candicent	Display Technology	Joint Research
TAKEDA	US Human Genomu	Bio Medical	Tech.Alliance

The success of these business partnerships shows that the Five-Circle Model is working for both the big companies and for the start-ups.

Sony and Toyota are already embracing this concept. And some of the new Japanese R&D-oriented start-ups—including Incs, Megachips, Future System, and Rakuten—are strategically expanding their business domains following this concept. (Chart 12)

Chart 12

R&D Oriented Emerging Entrepreneurial Company in JAPAN

Technology	Co.Name	CEO	Found	IPO	Person	$M	Technical Specialty
Mfg.Tech.	**INCS**	49	'90	-	110	30	3D Speed Tooling
	SAMCO	57	'79	-	100	33	Thin Film Tech.
System LSI	**Megachips**	57	'90	'98	90	60	Game LSI
	Thine	51	'92		40	95	AV LSI
	Realvision	45	'96		40	10	3D Image LSI
IT,Network	**IIJ**	52	'92	'99	270	300	Internet Provider
	Rakuten	35	'97	-	40	60	Network Mall
	Mag Mag	29	'97	-	10	5	Mail Magazine
	Future	44	'89	'99	150	40	System Integration
Game Soft			many companies				

This Five-Circle Model could be the catalyst for new industry development in Japan. R&D-oriented start-ups and large corporations and companies in the manufacturing, service, and finance industries will enjoy both competition and collaboration with each other in a very unique way.

By leveraging the Japanese industry's strength, the ***key devices*** will have a significant influence on the growing industry, the ***network economy***.