Technology Parks and Holding Companies
A Framework for Survival, Growth and Development of Technology based Companies

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Introduction

Every country, for its movement toward advancement and majesty, needs structures to solve the problems of society (unemployment, marriage, housing, inflation, brain drain and etc.) in short term and on the other hand, could steer these structures towards wealth production and social welfare through a rational, scientific and functional relation.

In this text, the aim is to design and construct a nongovernmental financial provision structure that with coherent and efficient support of institutions and entrepreneurs which their production is in the fields of new1, novel2 and advanced3 technologies, assist them in design, production, development and marketing (or market building) of new products, because costs of these stages are so high for young companies and entrepreneurs and accompany a maximum risk, as the average life of young companies is estimated about 3 to 5 years.4

Young companied which are formed by entrepreneur experts and young graduates having new and innovative ideas, in their early years of establishment, are not able to present in markets, especially in export area. This will cause them not to have enough growth and will decrease their competitive advantages.

Necessity of Technology Development

Technology can be defined as all knowledge, processes, tools, methods and systems used in manufacturing products and giving services.5

Technology includes three disparate components with the same importance. These components are hardware, software and mindware. The fourth component which should be considered separately is Technical knowledge.6

Technology has always had primal role in wealth production of countries and severely affected the living standard and quality of it's people.

The effect of technology was so high that the advancement of civilization is marked by the dominant technology of that period. Majesty in technology results in economic, political and social majesty. Figure 1 shows the technology change trend in recent 300 years.

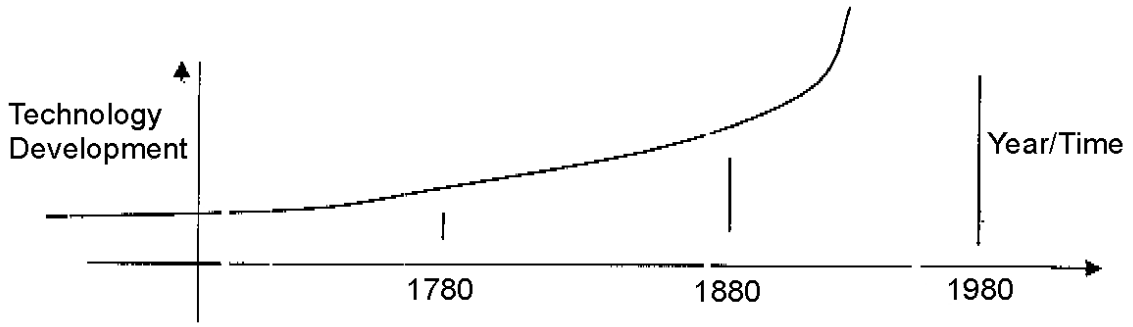

Figure 1

Technology advancement have had a positive effect on capital market, as stock market of USA have grown like what is shown in figure 2 based on Dojones industrial index.

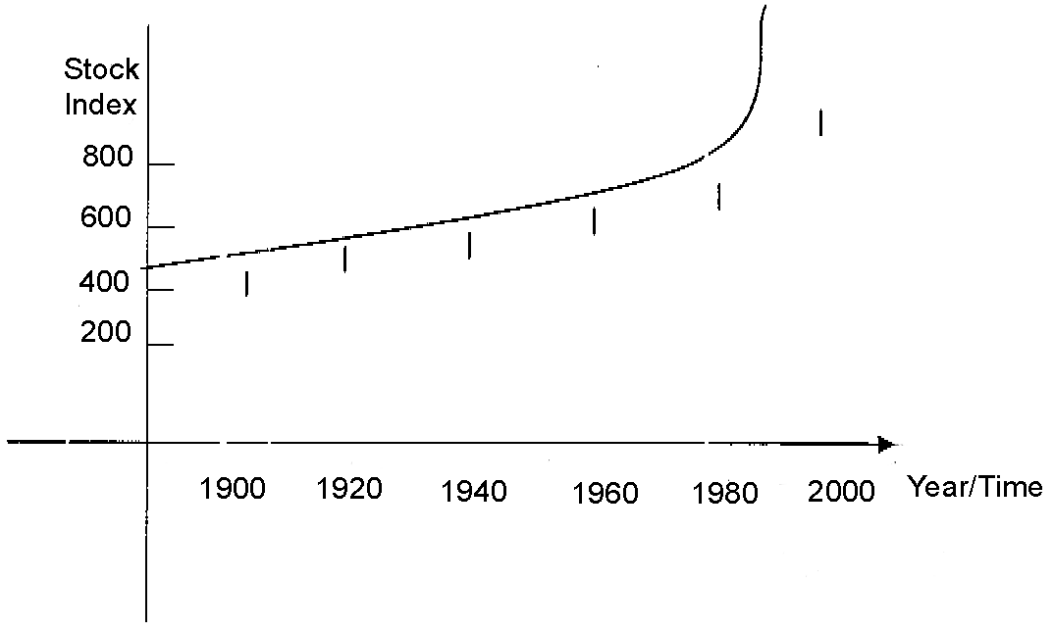

Figure 2

New and novel technologies have lead the economy of industrial countries to new horizons characterized by low inflation and unemployment ratio, dynamic and logical capital market, increase of per capita income and high productivity.

Technology development through the expansion of young and entrepreneur companies

These positive signs have been seen when companies and entrepreneurs have succeeded to design and produce their goods in accordance with the needs of customers and encourage customers to use their products.

In developing countries like Iran, the costs of establishment, growth, development and survival of enterprises producing technology-based productions is extremely high. These enterprises should pay a lot to be involved in domestic and foreign markets; But in developed countries, venture funds, banks, venture capital companies or individual capitalists not only underwrite some part of this capital and risk, but also become a copartner in their profit, share and their administration method.

Stating differently, more than higher risk, they have the expectancy of higher profit than the common ratio. But the partnership of funds and capital venture companies is not limited to financial support. These institutions also provide other supportive and consultancy services in different fields like financial, official, legal, administrative, marketing, design, technologic, applied planning, commercial and etc. They also can perform practical and executive roles and provide unpracticed and young entrepreneurs with high efficiency helps, because small, creative and entrepreneur firms are largely focused on technical points of their ideas and so, will less cerebrate about financial and administrative issues.

Basically, for the survival of companies established to produce technology based productions, it is necessary to be able to rapidly make change in their production in accordance with customer's ideas and needs and supply them. These companies need three categories of capitals:

1. Capital, necessary for research and study in order to produce the production and also performing rapid change in accordance with customers and marketing needs;
2. Capital, necessary to produce primary productions and preserve their share of the market this product

3. Capital, necessary for expansion and development of new ideas and products in order to increase the share in market, decrease overload costs, changing the feelings of customers towards productions from satisfaction to interest, and finally increase of competitive advantage against rivals.

The role of technology parks in technology development

The future impel us towards advanced professionalism in design and implementation of technology parks as the center of technology and commerce growth which include "managed framework" and "inventive forms" as tools to structuralize lost rings between universities and industries and making a natural and institutionalized relationship between them in order to generate, transfer and naturalize superior technologies due to national development aims and finally economic advancement and welfare of public and increased international competitive power.

Of course, it is necessary to have this understanding and conceiving that today, technology-based activities are the actual engine of advancement in developed countries. It is more than 50 years that technological and commercial parks and incubator systems have expanded in developed countries and today, more than 70% of the GDP of industrial countries comes from technology development.

Experience of late 50 years of industrial countries and late two decades of developing countries (China, Korea, India and Malaysia) shows that to accelerate sustainable economic growth, our country should severely reconstruct it's strategic plan and on taking necessary skills, establish essential structures to develop in globalizing environment.

It should be accompanied by increase of investment in optimization and reverse engineering (situation of USA, Germany and Japan after the Second World War and Korea, China and India respectively 20, 15 and 10 years ago). Getting that aim, the following situation should be provided:

- Collaboration between research centers, industries and universities and execution of mechanisms to support small and medium enterprises and entrepreneurs.
- Establishment of industrial clusters which have the ability to cooperate and grow in domestic and international environments of competition.
- Encouragement to expand the praxis of networking, data sharing and venturing.
- Determining about strategic and general technologies which have the capacity of local investment and also formulation of catholic landscapes and results of investigations accompanied with fast sample creation and marketing (or market generating).
- Preparing occupation opportunities for graduates and students and also consultation services for members of university faculties and research centers.
- Legislation of new rules and laws for entrepreneurship activities like tax exemptions.
- Possibility of legal ownership right of land and building for domestic and foreign investors.
- Investment possibility of domestic and foreign individuals and legal entities whether directly or through contracts.
- Providing financial resources to strengthen higher education, industrial engineering and production engineering.
- Cooperation (Synergy) between research centers of academic institutes and technology-based companies.

Meanwhile, the strategy of "nudging into diffusion of obtained sciences and enforcement of competition" is as important as the strategy of "encouragement of innovation".

The industry will loose its competitive power in market transitions without obligation to perpetual improvement of processes and productions. Competitive power is a dynamic bench mark. A company or country should have the velocity of moving from one production and market to another, or it will straggle forever.

For survival in this rivalry and synchronization with transitions in long term, it is necessary to use existing potencies along with other's experiences.

The Role of Small and Medium Enterprises (SME,s) in Economic Systems

The number of fulltime personnel working in enterprises is the major measure in most of countries considered for identification and classification of small and medium sized enterprises. According to

that, if the number of personnel is less than 300 (or 500) then the enterprise is considered as small or medium-sized.
Small and medium-sized enterprises have an important role in socioeconomic system and are counted as one of the most important factors in economic growth, employment, value added and export in economic system of countries.
The following table shows the share of small and medium-sized industries of employment in industrial production of different countries:

Rank	Country	Small Industries (less than 100 personnel)	Small and medium-sized industries (less than 500)
1	Italy (1981)	58.9	80.2
2	Japan (1980)	57.8	73.4
3	Ireland (1980)	38.1	79.6
4	Portugal (1985)	43.8	77.5
5	Denmark (1982)	39.8	74.4
6	France (1980)	44.1	72.9
7	Holland (1980)	38.8	-
8	Belgium (1985)	32.8	58.7
9	Luxembourg (1980)	19.2	45
10	West Germany (1983)	16	40.8
11	England (1983)	22	36.4
12	USA (1986)	23.7	37.4

According to this table, small and medium-sized industries (with less than 500 personnel) have 70% to 80% of industrial employment, whereas it is less than 40 percent in England, Germany and USA. In our company, there are about 700,000 small and medium-sized companies which have a determinant role in the employment of job seeking people.
Professor Paul Jeroski from "London Business School" has written in Sloan Management Review in autumn, 1990 that "English people trend to relatively standard productions in long terms whereas Germans, … vice versa manufacture varied productiond with high quality and compact …, surprisingly, this approach has not decreased their efficiency and the productivity of each German labor is two times of English labor. The period of mass production has ended and this will evolve our industrial system."
The advantages of Small and medium-sized companies over large companies

- The excellence factors of small and medium-sized companies and innovation advantages in these industries come from their difference in administrative structure with large size enterprises. Structural officiating in large enterprises prevents them from welcoming new high risk ideas and projects. In these enterprises, an innovation decision should pass through different officiating layers. In these layers, basically, resistance against risks change to negative prejudgment about new ideas, whereas in small and medium-sized enterprises, few people decide about innovation.
- Small enterprises prefer youths as their personnel. These organizations have less historical and traditional history, because they have a new culture and there is little likelihood of change in them, and in necessary, it will be easy to change.
- Most of innovations have occurred in free environments rather than officiating ones; that's why small enterprises have attracted those researchers who has been ignored by large enterprises.
- Utilizing small and precise technologies in not economic for large and huge enterprises and so is ignored by them. But young, venture and entrepreneur enterprises focus on new products

and processes so that earn a lot through them. But these opportunities hardly happen for large enterprises.

- In large enterprises, best researchers are encouraged and get administrative degrees, whereas in small enterprises, innovation and related activities are their focus point of competitive approach.
- Small enterprises can produce innovative products; They expend low investment and use research spillovers of universities and large enterprises to change these researches to indoor data for science generation.
- Small - medium-sized and entrepreneur enterprises are much more brisker than large enterprises because of their: new ideas, motivation, youth hood verve, spiritedness, risk taking, hope to future and fast decision making.

Defects and disadvantages of small and medium-sized companies over large companies.

- Innovative activities need stable, high expenses: research and development are high cost processes which need mass production. Therefore just those which have necessary resources can coupe with them.
- Only those enterprises which have a good power in market may use innovation to maximize their profit. Their ability of taking in the advantages of economic profits of using research and other investments in science generation is directly related with their power in market.
- Research and development is accompanied by venture capital. Small enterprises increase their risk by involving the individual in research and development and expending most of their limited resources for an idea which increases their own vulnerability. But their large size competitors minimize this risk at the same time by diversifying to their researches and executing different projects. What the enterprise is larger, the possibility of using the results of innovation in production process increases too.
- Mass production may result to advantages in research and development in economy: Mass production, whether in advertising stage or in distribution, facilitate the influence of new products on market and enable large industries to better use of innovation resources.
- Innovations which decrease expenses by some percents are more visible in profit of large rather than small enterprises.
- High efficiency is more important for small enterprises rather than large enterprises, because large enterprises have more financial resources and small enterprises are weaker in coping with results of unproficiency.
- Small and medium-sized enterprises have not the ability to win great bids because: 1)bid holders have more trust in large and old-line enterprises, and 2) large enterprises are more maneuverable and have less prices to win; although the may do it by loss but in long term, they will eliminate all rivals.
- Providing low cost financial resources and getting loans is very difficult and time-taking for small to medium enterprises and entrepreneurs because banks and financial institutes give loans only by providing reliable bails (estate documents, paper monies and etc) but most small to medium-sized enterprises and entrepreneurs cannot afford these documents and so, will usually face low cash which leads to low proficiency.
- Small and medium sized enterprises should pay all costs for about 2 years and after that it might become beneficial and they will use the profit of their investment. It will increase their risk of activities because they have to use their personal resources for new projects.

Solutions for Elimination of Defects and increasing the survival period of small and medium enterprises

The idea of Holding Company and establishment of a financial provision structure is offered as a solution to eliminate or at least decrease defects of small and medium-sized enterprises and support frameworks and bases necessary for investment in new technologies in order to provide coherent and

working support of these enterprises and entrepreneurs intending to work in these fields in science and technology parks. Investors and stockholders of these Holding Companies include:

- Small and medium-sized enterprises in science and technology parks as the main beneficiary. Although these firms have small capitals, but posses good brand names and markets. It has a good value an reliability on it's own, because in valuation of assets of an enterprise, brand in considered valuable too.
- Science and technology parks as the main supporter and provider of varied advantages of small and medium-sized enterprises which can attract investors through their unique stand and situations like tax exemptions, placed in most adequate positions, accredited to authorized agencies and etc.
- Large investment enterprises, banks, credit and financial private or institutional organizations or their dependent investment companies interested in investment in new technologies.
- Other legal entities and individuals interested in investment. Acquaint of people with stockholding in investment companies because of expansion of stock exchange in recent years, establishment of large stock companies with participation of hundreds of thousands of people, new government advocacy of these companies and the subject of activity in new technologies, more than existence of huge amount of cash in hands of people will provide enough appeal to establish these companies.

Conclusion

In recent decades, technology based industries have become the economic development engine of countries. Herein, the role of modern structures like technology parks, growth centers as ability enhancement institutes of small and medium-sized enterprises and active entrepreneurs in fields based on new technologies have been severely focused on. But small and medium-sized enterprises have defects and holding companies with following goals is adequate for covering them:

1. Decrease of small and medium size enterprises in design, production, marketing and development of productions through common works and lessen scum costs;
1. Reducing risk of activities and increasing the lifetime of enterprises from 2-5 years to 10-15 years or more;
2. Help to speedup commercialization of ideas and research discoveries of enterprises and expanding their markets;
3. Providing financial resources to perform development projects of new products with convenient requirements;
4. Providing financial, official, legal, administrative, marketing, designation, technologies, planning and commercial consultancy services;
5. Providing the possibility for participation of general public in investment projects of new technologies through their stockholdering public in holding companies.
6. The possibility of marketing (or market generating) for products of small or medium-sized enterprises.
7. Providing the possibility for hire purchase of products of small to medium enterprises and entrepreneurs and preparing financial resources for that.
8. Providing the possibility of insurance of investment projects of small and medium enterprises and entrepreneurs and covering their risks.
9. Providing the possibility of attracting financial resources from domestic and foreign financial and credit institutes.

And other facilities which small to medium-sized enterprises cannot afford (financial and administratively) on their own.

Sources:

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- X. Zoltan J and Turik Roy and Buo Erlson, 1383, "Role of small industries in Modern Economy", translated by Jahangir Majidi, Resa publication, Tehran
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Notes:

1. New Technologies: technologies newly exhibited or implemented which should have a clear and obvious on operation of organization (in production and presentation of products). This technology has a deep effect on improvement of productivity and preserves the competitive advantage of the enterprise. Like engineering softwares. ("Technology Management" by Tariq Khalil)
2. Novel Technologies: Technology which has not been commercialized yet but will be commercialized till next 5 years and is predicted to develop increasingly. Like Genetic Engineering, Nanotechnology and superconductors. ("Technology Management" by Tariq Khalil)
3. Advanced Technologies: Technologies in which highly educated people create it's main context. Technology change ratio is higher than other industries. It compete with it's innovation and will expense a lot on research and development and finally, will use technology for it's fast development. ("Technology Management" by Tariq Khalil)
4. "Sarmaye Gozari Khatar Pazir", Kamran Bagheri
5. "Technology Management" by Tariq Khalil
6. "Technology Management" by Tariq Khalil
7. "Technology Management" by Tariq Khalil
8. "Technology Management" by Tariq Khalil
9. through 50 years, Silicon Valley phenomenon (a Technology Park called "Silicon Valley"), a 50 miles strap from San Francisco and Berkeley to San Jose in California has grown so that accommodated more than 8000 electronic-software enterprises with 500 billion Dollar Market, and because of it's special situation, still new companies and investors are accumulated there. In this park, about 50% of 350000 first level scientist and experts are from foreign countries (mainly developing countries and third world)