Strategic Analysis of the Presence of Corporate Venture Capital in Iranian Science and Technology Parks and incubators

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Abstract: Corporate Venture Capitals (CVCs) are important financial innovations used for financial resourcing of new high-risk and high-tech organizations. In order to reduce existing risks, CVCs have focused on developing firms, science and technology parks and incubators by their main twofold functions. The first function is providing the capital needed for the commercialization of ideas, plans and designs of entrepreneurs and the second one is preparing a good market for CVC. In present study, it is attempted to detect the internal strengths and weaknesses of science and technology parks and incubators using one of the most important strategic management instruments, i.e. SOWT model as well as to analyse environmental opportunities and threats confronting CVCs in science and technology parks and incubators and to represent the strategies in four strategic groups, such as SO, ST, WO, and WT. All strategies are prioritized using TOPSIS technique among these four groups which the most important strategies are using the experiences of pioneer countries in the field of CVCs, science and technology parks and incubators. The main purpose of this study is finding and sharing the benefits or losses of the developing companies and also developing activities associated with establishing relationship between investors and holders of new ideas such as market technology.

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1. Introduction

Nowadays, the importance of science and technology is clear more than ever. Industries have found that effective usage of science and technology is the main key to achieve higher efficiency and benefits. Governments have concluded that competition in world markets and maintaining national security is impossible without science and technology. Societies have discovered that their welfare and accomplishment is depends on how they employ science and technology appropriate in satisfying their national needs. All these issues have challenged governments in providing suitable models. Science and technology parks and incubators are considered in these models [Keshavarz et al., 2004].

An incubator or a science park provides resources like space, goals, marketing, management, structure and financing to new technology-based firms (NTBFs) [Aaboen, 2009]. In other words, one of the objectives of Science Park or incubator's establishment in most countries is to provide an infrastructure of technical, logistic and administrative support that a young firm needs in the process of struggling to achieve a profound stand in a competitive market [Chan et al., 2005]. They could also be seen as a part of resources transfer that enables the development of firms based on the innovations made at the university [Aaboen, 2009]. So, it is particularly important to those industrialized economies whereby small high tech firms are encouraged in their start up stage [Chan et al., 2005].

In addition to preparing all supports science and technology parks and incubators, it could be assuredly said that creating mechanisms for financial resourcing of innovative activities is the most important factor in fulfilling the designated technology development goals. There are different mechanisms for financial resourcing of innovative activities which are depending on the conditions and elements of the economical system of a country. But corporate venture capitals in the economical system have the most importance due to the latent riskiness of entrepreneurship. In addition, innovative activities, natural and long-term investment returns and financial-credit mechanisms are not suitable ways to finance them. In other words, traditional financing mechanisms which are based on short-term loans could not be considerable help to establish and develop the small and incipient firms. Therefore, functioning of such funds is the main prerequisite to supporting these incipient firms and improving entrepreneurship and innovation in the national innovation system [Mahbubi et al., 2003]. In the following, reserchers will present definition of CVCs and their relationship with science and technology parks and incubators, SWOT Model, explenation of TOPSIS technic and finally weaknesses, strenghths,

opportunities and threats confronting CVCs in science and technology parks and incubators and to present the strategies in four strategic groups of SO, ST, WO, and WT. All strategies are prioritized using TOPSIS technique.

2. CVCs and their relationship with science and technology parks and incubators

Since the early 1990s, US corporations have invested billions of dollars in young entrepreneurial companies (start-ups). By the late 1990s, corporate venture capital (CVC) accounted for nearly 15% of total venture investment in the US economy based on their investment activity. CVCs' parent corporations are often active players in new technologies and products markets in which start-ups are positioned; they appear to be natural candidates to engage in venture investment activity [Masulis et al., 2009].

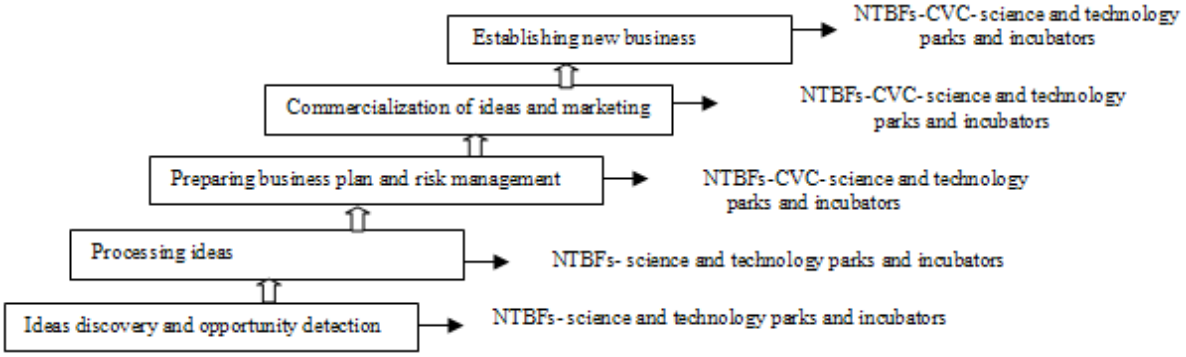
CVC is defined as any equity investment made by non-financial corporations in entrepreneurial companies for both financial and strategic objectives. That is, besides achieving financial objectives similar to independent VC investments, CV investments have a variety of strategic implications. Particularly, CVC programs have been used as effective routes to achieve these strategies [Yang et al., 2009].

CVCs invest in firms could bring high payback in a period of 5 or 7 years. Risking investors examine thousands of firms before any investment and choose a few firms which have good investment opportunities. These firms are financed by retirement funds, companies, wealthy people, and foreign investors or by themselves. A summary of the features of corporate venture capitals have been mentioned follow:

1- They finance in new, small and rapidly growing firms.
2- They share the ownership of these firms.
3- They help to develop new products and services.
4- Increase stock value with their active participation.
5- They risk higher, in order getting high profit.
6- They pursue long-term purposes [Mahbubi et al., 2004]

It might be questioned that what relation could exist between science and technology parks and incubators and CVCs? In other words, what vital role do science and technology parks and incubators play in the process of a venture capital? Chart 1 summarizes the role of incubators and science and technology parks in the process of a venture capital [Kanani et al., 2004].

Chart 1- relationship between CVC and science and technology parks and incubators



As it can be seen, in the first two stages, incubators and science and technology parks help new firms to identify and process their ideas. In the third and fourth stages, incubators and science and technology parks establish a relationship between CVCs and firms in order to design their business plan, manage threats and operationalize and market ideas. In the last stage, incubators and science and technology parks stay aside while firms establish new business with the aid of CVCs.

In fact, incubators and science and technology parks provide the necessary capital for the commercialization of ideas, plans and programs of the entrepreneurs and also provide suitable market for the owners of venture capitals in order to pick out the best investment opportunities by having a list of the best options of firms and innovative people. The above chart shows that in regard with the intricacies and ambiguities of investment in innovative activities, professional mediating institutions such as incubators and science and technology parks are a necessity in the interactive process with CVCs.

3. SWOT Model

SWOT analysis is one the most important instruments of strategic management for compromising between internal strengths and weaknesses and external opportunities and threats. SWOT analysis provides a systematic analytic

method for detecting these factors and choosing a strategy that makes the best compromise between them [Fisher, 1989]. Based on perspective of this model, an appropriate strategy should maximize strengths and opportunities and minimize weaknesses and threats. For this reason, internal strengths and weaknesses and external opportunities and threats are represented in four general states of WT, ST, WO and SO and then strategy options are created and chosen [Harrison et al., 1994]. In SO strategy, it is attempted to utilize environmental opportunities by relying on internal strengths. In WO strategy, the aim was to reduce internal weaknesses by utilizing existing opportunities. In ST strategies it is attempted reduce impacts of the external environment using the internal strengths. Finally, in WT strategy which is considered to be the worst state, the aim was reduce internal weaknesses and avoid external threats [David, 2000].

In Table 1, SWOT matrix is shown. This matrix consists of 9 cells. As it's mentioned, four cells contain the main factors; the cells represent strategies and one cell is blank or empty. In order to create a SWOT matrix the following 8 stages should be followed:

1- List the external opportunities
2- List the external treats
3- List the internal strengths
4- List the internal weaknesses
5- Match internal strengths with external opportunities and record the resultant SO Strategies
6-Match internal weaknesses with external opportunities and record the resultant WO Strategies
7- Match internal strengths with external threats and record the resultant ST Strategies
8- Match internal weaknesses with external threats and record the resultant WT Strategies [David, 2000].

Table 1 – SWOT matrix

	Strengths(S) List Strengths	Weaknesses (W) List Weaknesses
Opportunities (O) List Opportunities	SO Strategies Use strengths to take advantage of opportunities	WO Strategies Overcome weaknesses by taking advantage of opportunities
Treats (T) List Treats	ST Strategies Use strengths to avoid threats	WT Strategies Minimize weaknesses and avoid threats

4. Methodology

This is a practical study. Also, this study is empirical and descriptive regarding data collection. The methodology comprised of 3 stages. First, the researcher prepared a list of strengths, weaknesses, opportunities, and threats of Iranian science and technology parks and incubators for the presence of CVC. In the second stage, SO, WO, ST and WT strategies were proposed. These two stages were performed by a complete examination of literatures, studying books, articles, previous researches, and interviewing 30 experts. Finally in third stage, questionnaires were used to prioritize strategies using TOPSIS technique.

The questionnaire was spread among 20 experts. The idea of TOPSIS would be expressed in a series of steps.

1. Quantification and normalizing of decision matrix (N): for normalizing, norm non-scale is used.
2. Obtaining the balanced normalized matrix (V): the normalized matrix (N) is multiplied by the diagonal matrix of weights ($W_{n\times n}$), $V = N \times W_{n\times n}$
3. Determining positive and negative ideal solutions: positive and negative ideal solutions are defined, respectively:

(Matrix vector of the best values of each index V) = positive ideal solution (V_j^+)

(Matrix vector of the worst values of each index V) = negative ideal solution (V_j^-)

4. Evaluation the distance between each option and positive and negative ideals:

Euclidean distance of each option and the positive ideal (d_j^-) is calculated according to the following formulae:

$$d_i^+ = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^+)^2}, \qquad i = 1.2....., m$$

$$d_i^- = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^-)^2}, \qquad i = 1.2...., m$$

5. Determining the relative closeness (CL) of an option to the ideal solution:

$$CL_i^* = \frac{d_i^-}{d_i^- + d_i^+}$$

6. Ranking options: every option with a bigger CL is the better [Momeni, 2006].

5. Findings

5.1. Strengths, weaknesses, opportunities, and threats

The mean of strengths is merits and abilities of science and technology parks and incubators and

also the mean weaknesses is existence of restrictions and shortages in science and technology parks and incubators for the presence of CVCs. Strengths and weaknesses are true about those factors which are under the managing control of science and technology parks and incubators and they could plan an important role for their operation. Environmental opportunities and threats confronting the presence of CVC in science and technology parks and incubators are another part of SWOT model. The mean of opportunities is desirable and suitable environmental conditions for the presence of CVCs in science and technology parks and incubators. Finally, threats mean that those undesirable or unsuitable environmental conditions which affect science and technology parks and incubators adversely and impede their development. In table 5, strengths and weaknesses, and opportunities and threats from the viewpoint of commentators are presented.

Table 2. Strengths, weaknesses, opportunities and threats of science and technology parks and incubators

Threats	**Opportunities**
- Low investment security in the country and lack of tendency in CVCs to invest in Iran - Increased number of elite and student migrations and decreasing probability of the emergence of creative ideas - Non-institutionalization of entrepreneurial culture in society and universities - Shortage of financial encouragement and support from entrepreneurs and risk-taking investors - Lack of financial support of CVCs - Lack of profitable capital markets suitable for investment return and collecting the profit gained from investments - Scarcity of experienced and well-trained managers for running CVCs - Regulations controlling bank, insurance companies and retirement funds which undermine their role in capital venture - Structure of the Iranian government and a decrease of the investments made by private sector - Low activity of foreign risk-taking investors in Iran - Insufficient development of advanced technologies and industries	- Embargos and the possibility of producing the embargo products by domestic innovation - Government support of entrepreneurial activities and developing them - people's tendency to consume high-tech new goods, particularly among the youth - Possibility of higher exports in case new and internationally comparable products are produced - Government's approach to privatization and enforcement of its regulations - Higher population of the educated people and hence higher probability of proposing creative ideas - The possibility of high profitability from the existing creative ideas in science and technology parks and incubators - Government's attention to the important role of CVCs in the entrepreneurship development process.
Strengths	**Weaknesses**
- Employing a strong and knowledgeable personnel to offer legal, management, financial, marketing, sales, and technical advices - Founding most of the science and technology parks and incubators next to universities - Credit and budgets to support production of new products in science and technology parks and incubators - Presence of educated people in management and administrative section of science and technology parks and incubators - Arrangement for the accommodation of newfound firms in science and technology parks and incubators - Arranging for professional training programs for newfound firms.	- Lack of any well-designed plan for the presence of science and technology parks and incubators - The governmental structure of science and technology parks and incubators - Insufficient advertisement of the services science and technology parks and incubators provide in society - Little cooperation of science and technology parks and incubators with industry and private institutions - Lack of a good, comprehensive information system for proclamation of the latest inventions and achievements of the firms in science and technology parks and incubators - Dependence of science and technology parks and incubators income on government - Not linking science and technology parks and incubators with CVCs, industries, research resources, private institutions and other resources in a network - Science and technology parks and incubators not sharing in the benefits and losses of firms in them

5.2. Strategies

In this section, strategies and approaches for confronting threats, using opportunities, eliminating weaknesses and enhancing strengths for the presence of CVCs in science and technology parks and incubators are shown in table 3, in regard with internal weaknesses and strengths and environmental opportunities and threats. These strategies are also prioritized using TOPSIS technique. The results of TOPSIS technique and strategies are shown on table 3 In the order of their importance suggested by experts and professionals. It's noteworthy that implementing some of these strategies is possible only by assistance of administrative and governing departments.

Table 3. Presentation and prioritization of strategies using TOPSIS technique

Strategy Type	Strategy	d_i^+	d_i^-	CL_i
ST	Using the experiences of advanced countries in the field of CVCs	0.0359	0.0008	0.813
WO	Science and technology parks and incubators sharing benefits and losses of newly-developed firms	0.0340	0.010	0.776
WO	Developing activities related to establishing relationship between investors and holders of new ideas such as market technology	0.0339	0.010	0.775
ST	Establishing comprehensive copyright system in Iran	0.031	0.012	0.714
WO	Establishing common industry and university information to achieve new ideas and needs	0.029	0.013	0.691
ST	Using different advertising tools for introducing capacities and advantages of the country to foreign and domestic investors	0.031	0.016	0.656
ST	Granting financial exemption and other arrangements to CVCs	0.027	0.016	0.620
SO	Establishing strategic committee for the presence of CVCs with the participation of the directors from all science and technology parks and incubators of Iran	0.031	0.020	0.606
SO	Granting special funds to support practical researches and organizing training courses for the academics	0.025	0.017	0.596
ST	Creating free and open economic atmosphere for more extensive presence of CVCs in economy of Iran	0.025	0.018	0.0590
ST	Training entrepreneurship and CVC management in management and engineering faculties	0.026	0.019	0.578
WO	Designing strategic plans for the presence of CVCs in parks and incubators	0.028	0.022	0.513
ST	Modifying the ownership and management structure of banks and retirement funds and using modern financial instruments to provide bank services	0.025	0.021	0.543
ST	Using appropriate financial initiatives such as granting loans and assistance to improve entrepreneurship and investment	0.023	0.021	0.521
SO	Introducing investable university proposals to industry (Industries and mines chamber, chamber of commerce, etc.) and vice versa.	0.023	0.022	0.513
WT	Accelerating privatization and pruning government and state-run firms	0.023	0.024	0.498
WT	Establishing relationship with accredited entrepreneurship and business management faculties of successful countries to transfer their knowledge end experiences	0.022	0.023	0.492
SO	Studying society and industry and assessing their needs and directing individuals to produce new products with respect to the needs of the society and industry	0.022	0.025	0.468
WO	Improving and increasing advertisement about supports science and technology parks and incubators offer	0.022	0.25	0.467
SO	Studying international markets and evaluating their feasibility in order to develop exports and encouraging people to produce products which are able to compete in the international market	0.021	0.026	0.456
ST	Using various financial tools in capital market	0.020	0.024	0.453
ST	Joining international copyright conventions and treaties	0.019	0.024	0.447
WT	Improving the quality of education in universities and providing people and on-site groups in science and technology parks and incubators with welfare and laboratorial facilities	0.021	0.027	0.442
ST	Facilitating admission of newfound firms in the stock market in order to cash the investment made in newfound firms	0.019	0.029	0.401
SO	Increasing the number of entrepreneurship training programs and producing creative ideas among academics and the public	0.017	0.026	0.392
ST	Supporting the development of modern industries and technologies, in particular informational, computer and internet technologies	0.017	0.031	0.360

As it's mentioned in table 6, the strategy of using the experience of pioneer countries in the field of CVCs, science and technology parks and incubators would share benefits and disadvantages of new firms, developing activities related to establishing relationship between investors and holders of new ideas such as market technology, establishing comprehensive copyright system in Iran and creating information bank for industries and universities in order to achieve new ideas and needs which proposed by the experts as the most important strategies.

6. Conclusion

Development of entrepreneurship and emergence of entrepreneurs in a society requires certain conditions and necessities such as establishment of underlying structures and institutions. Science and Technology parks and incubators are considered as supporting and underlying institutions for the development of entrepreneurs. Dynamic and developed firms received various supports including financial support from technology and science and technology parks and incubators. Currently the most important financial support resources of parks and incubators are funded by the government. Persistence of this trend and absolute dependence on government funds in the long run is neither appropriate nor feasible.

But CVCs could gain their targeted payments to increase the value of firm. This goal is much different from other financial support tools such as loans in which only profit is received. Therefore, CVCs have a purpose similar to certain owners of a firm. Therefore, measures must be taken to have corporate venture capital in parks and incubators.

In the present study, researchers examined the internal (strengths and weakness) and environmental (opportunities and threats) conditions and proposed strategies for the presence of CVCs in science and technology parks and incubators of Iran by reviewing the theoretical basis, interviewing professional and employing one of the most powerful strategic management instruments, i.e. the SWOT model. Findings of these analyses are presented in tables 1 to 3. In sum, 6 strengths, 8 weaknesses, 11 threats, 8 opportunities, 6 SO strategies, 12 ST strategies, 6 WO strategies and 3 WT strategies were detected in this study. Finally, strategies were prioritized using TOPSIS technique and it was concluded that using the experience of pioneer countries in the field of CVCs, science and technology parks and incubators sharing in the benefits and losses of newfound firms, developing activities related to establishing relationship between investors and holders of new ideas such as market technology, establishing comprehensive copyright system in Iran and creating information bank common to industry and university in order to achieve new ideas and needs, using various advertising tools in order to introduce capacities and advantages of the country to foreign and domestic investors, granting special financial exemptions and assistance to the CVCs and establishing strategic committee for the presence of CVCs by participation of directors from all science and technology parks and incubators of Iran are considered as the most important strategies.

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