Entrepreneurship Models of the Countries that Leverage Silicon Valley

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Abstract

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We are now in an information economy. Knowledge is the main element in the creation of the today's enormous gain in value. Most of the time knowledge thought to be the centered in a firm but it is certain that there appear to be certain regions in which some considerable portion of this knowledge is nomadic and moving from position to position throughout the region. As a result, the knowledge is embodied in the individuals with specialized skills and capabilities.

In this work, we analyze the overseas entrepreneurship models in high tech industry. Silicon Valley is the most pronounced place for an entrepreneurship success. In

this regard, we investigate what can contribute to understanding and encouraging the development of entrepreneurial regions. Then, we look at the mechanisms of the Valley and determine how the inputs and interactions nurture entrepreneurship in an increasing number of regions abroad. We also observe the Valley in a broader sense and talk about the boom-and-burst cycles of the Valley including next cycle.

Silicon Valley as a model showing signs to proliferate globally. We analyze the foreign models and discuss their preliminary conditions and actions that make them successful among the others. We mainly focus on India, Israel and Ireland which has spawned proto-Silicon Valley with venture capital and some regional institutions.

Prof. Edwin M. Epstein
Thesis Committee Chair

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1 Introduction

"In a series of articles that Don Hoefler wrote for ELECTRONIC NEWS of 1971, a weekly tabloid, he first used the phrase "Silicon Valley" to describe the *congeries of electronics firms mushrooming in Santa Clara county*. " Silicon Valley is an area that located on the San Francisco, California, peninsula, radiates outward from Stanford University. It is surrounded by San Francisco Bay on the east, the Santa Cruz Mountains on the west, and the Coast Range to the southeast where major high-tech firms were created in the post-WWII era. Analogue in the east coast of the US is Route 128 surrounding of Boston Massachusetts [1].

Silicon Valley remains the center of high-tech innovation for the last half century. Preserving its place as the command center of the global tech businesses, Companies in the Valley are expanding in research, design together with support activities overseas. Although the high tech industry in the valley is expanding in a broader sense, software development is diminishing and going offshore as happened in US manufacturing in 1970s and 80s [1]. This makes the companies in the Valley connected with the technology parks in overseas. This interaction brought a boost for the companies since progress is achieved faster than before with a less investment.

Offshore projects bring challenges like communication and coordination with other cultures and other places. Software-development projects depend on close interaction among colleagues. Some countries are ahead of the others and become beneficiaries of

[1] http://wwww.netvalley.com.

the Valley by leveraging the companies' economic profit with their Silicon Valley like entrepreneurship models.

Examination of those models with the interconnection of the Valley is crucial for other countries to set an example. We took the approach to examine the Valley first and then the entrepreneurial regions that are beneficiary of the Silicon Valley.

The history of the Valley is explained in Section 2. The Valley's history reflects the technological changes after 50s. The key role of the institutions such as Stanford University have been investigated in the paper. Silicon Valley has provided positive influence after the 50s and it caused the world economy to redefine itself with the inventions it introduced. In the last 50 years it was predominately active in the production of silicon chip, personal computer and the Internet. These products have drastically affected every sector of the economy like railroads, electricity and radio. In Section 2, companies in the Silicon Valley has been compared to the ones on Route 128, another technology center located in east coast. Comparison enlightens many characteristic of the Valley special to itself.

How Silicon Valley operates and which mechanisms that run the Valley are described in Section 3. Mechanisms convert an idea into a product and individuals into a company: Social infrastructure feeds the entrepreneurship and innovation with the help of private or publicly funded institutions. Venture capital industry invests in individuals that has a profitable idea. Offshore development, the practice of using outside vendors to plan and implement an organization's technology needs, creates bonds with other

countries by leveraging their knowledge and low wage structure. These subcomponents are investigated in a concrete frame work and examples of these interconnections are given in Section 3.

In Section 3, we discuss the inputs and outputs of the Valley such as low wage employment, rich research spending, expanded networking, etc. In Section 4, we look at the Valley in a broader sense seek the result of the outputs. Silicon Valley economy follows a boom-and-bust cycle. Economists argue that a new technology creates boom and economical bust starts after excessive amounts of entrepreneur and venture capitalist rush into the same area.

In Section 5, we look at the countries that leverage the Valley's potential and create economic profit. India, Israel, and Ireland are countries that have been successful in the recent cycle. Their preparation and individual achievements are clearly discussed.

In Section 6, we briefly talk about social bonds of the Valley and examine counterparts in the models we discuss in Section 5. We also explain how those countries can leverage the Valley. Finally, we conclude the paper in Section 7.

2 Silicon Valley History

2.1 Brief History of Silicon Valley

The name “Silicon Valley” defines the companies which are working on information technologies in south end of San Francisco Bay. This designation was a good fit given the momentous changes that the Valley had undergone since the early 1930s. San Francisco Peninsula previously home to a few radio enterpriser. Cumulative workforce was around few hundred mechanists and few engineers. They were considered as marginal compared to the total American radio industry which was centered on the East Coast. The area has become a major industrial center especially in electronics [2].

The growth of the Silicon Valley’s electronics complex has a vital meaning to understand how these groups developed new industries as well as innovative design and manufacturing technologies. The trace goes back to 1940s where the military patronage and procurement played a great role [2].

“After Pearl Harbor was attacked in 1941, America’s research community rushed to the defense of the nation, unleashing a torrent of technological innovations that ultimately overwhelmed Germany and Japan.

Radar helped to win the war and the atomic bomb ended it; that was the saying in 1945. Effective radar and the bomb, and many more technologies, were hatched in the pressure of battle, by scientists and engineers working closely with military leaders and for a president [12]”.

In the 40's and 50's, World War II and Korean War has boosted the growth of electronic industry. U.S. defense spending vs. the GDP has shrunk dramatically since the WWII from 130% to 15% during the Korean War to 12% during the Kennedy administration to just 4% currently [11].

The Valley had played a particularly a key role in the World War II. The semiconductor industry was nurtured on the need for ultra-small devices to power missiles and spacecraft, and companies like Lockheed mushroomed here at the height of the space race [12]. The Korean War also fueled the growth of the vacuum tube and system industries in the Valley [2]. In addition to the defense spending, the institutions and private economy stimulated growth. The role of local institutions of higher education such as Stanford University is important in the growth of the Valley.

Prior to World War II to increase the credibility of Stanford University and to create high technology, Stanford recruited prestigious academicians from east coast. Frederic Terman came from MIT (Massachusetts Institute of Technology) was one of these academicians. He is also known as "The father of Silicon Valley". Frederick Terman sought to strengthen the Valley's electronic industry by encouraging his students to start their companies near their university rather than going to the East Coast for work. The founders of HP William Hewlett and David Packard were two of those students [4].

Stanford University has played an important role in the emergence and expansion of the Valley. Having a vast amount of land but not much money led Stanford to use its land as a source for money. As a result in the year 1951 Stanford Industrial Park (SIP)

was created. The first firm to occupy SIP was Varian and it was followed by General Electric, Kodak and many others. These companies and many others are also nurtured with the help of the funds given by American defense industry on air, space and electronics technologies besides entrepreneurial success which increased the growth of the Silicon Valley considerably.

The material use of silicon for high-tech was in 1955. A former Stanford student, Dr. William Shockley established Shockley Transistor Company with his friends who came from east coast with him. Shockley's company failed. However, several of his former co-workers founded other companies.

Semiconductor technology is adopted as the replacement of vacuum tubes. Silicon material is used in the integrated circuits for chip design. In the 60's companies worked on chip design. High costs forced companies' to research for more economical ways and standardization of memory chips (DRAM).

As a company, Intel founded in 1968 developed a solution to the question of how many circuits can be placed in a piece of silicon. The beginning of the production of 1k memory chip in 1070's turned Intel into a standard maker.

Having the memory chips, companies focused on computers including all the subparts such as hardware, storage devices, etc. The computer era commences with Homebrew computer club that was formed by a group of students who wanted to make a personal computer in 1975. Another significant computer company Apple also started in a garage in 1976 [29]. By the year 1982, IBM was major player in the personal computer

market [2].

The networking has been the Valley's main focus after the widely adoption of computers. Another company that was formed in 1981 was named Sun, worked on connecting computers and remote access network. After Sun, in 1984 Cisco was formed and it became the second company following Sun in the market. The goal of Cisco was to connect the network in the campuses that was created by Sun and form a single network [27].

Internet WWW (World Wide Web) was presented as a language in 1990 by Tim Berners - Lee and Robert Calilliau from CERN (European Center for Nuclear Research) in Switzerland. The objective of WWW was to transfer an intended file from one computer to another in the same format. Until 1992 the growth of WWW was slow but this started changing in 1993 with the formation of Mosaic Communications Corporation, another Silicon Valley company, (later changed its name into Netscape Communica-

[2]In July of 1980, IBM representatives met for the first time with Microsoft's Bill Gates to talk about writing an operating system for IBM's new hush-hush "personal" computer. IBM had been observing the growing personal computer market for some time. They had already made one dismal attempt to crack the market with their IBM 5100. At one point, IBM considered buying the fledgling game company Atari to commandeer Atari's early line of personal computers. However, IBM decided to stick with making their own personal computer line and developed a brand new operating system to go with. The secret plans were referred to as "Project Chess". The code name for the new computer was "Acorn". Twelve engineers, led by William C. Lowe, assembled in Boca Raton, Florida, to design and build the "Acorn". On August 12, 1981, IBM released their new computer, re-named the IBM PC. The "PC" stood for "personal computer" making IBM responsible for popularizing the term "PC". The first IBM PC ran on a 4.77 MHz Intel 8088 microprocessor. The PC came equipped with 16 kilobytes of memory, expandable to 256k. The PC came with one or two 160k floppy disk drives and an optional color monitor. The price tag started at $1,565, which would be nearly $4,000 today. What really made the IBM PC different from previous IBM computers was that it was the first one built from off the shelf parts (called open architecture) and marketed by outside distributors (Sears & Roebucks and Computerland). The Intel chip was chosen because IBM had already obtained the rights to manufacture the Intel chips. IBM had used the Intel 8086 for use in its Displaywriter Intelligent Typewriter in exchange for giving Intel the rights to IBM's bubble memory technology [9].

tions).

The development of Silicon Valley has stimulated several debates, Stuart Leslie emphasized military patronage and university-industry relations [8], On the other hand, Brian Arthur, an economist, has seen the growth as the result of historical accidents and large scale economic forces. Arthur argues that "key people" such as Russell Varian and William Shockey were mainly in the area because of "historical accidents". They developed microwave tube and semiconductor firms and they attracted the other corporations which by the way explained by Arthur as localization. AnnaLee Saxenian, professor in UC Berkeley, argued that regional cultures and organizational forms need to be understood for the Valley and she looked at the Silicon Valley's meteoric rise and Route 128's concurrent demise [2, 29]. Compared to Route 128, she suggests that Silicon Valley's decentralized industrial structure promoted collective learning and flexible adjustment. Firms were able to adapt more rapidly to change.

According to Christophe Lećuyer development of the Valley does not reflect the theories of Leslie, Arthur, or Saxenian. It is not primarily a cluster of firms, as Arthur implies, nor a networked cultural economy like Saxenian argues. And also for Lećuyer the Valley can not be considered as the outgrowth of Stanford University's research and teaching programs. Lećuyer describes the Valley as a mix of continually shifting ecology of machines, skills, practices, technical groups, and institutions which were strengthen by a unique social regional environment [2].

On the other hand, Martin Kenney argues as follows; " The secret of the Silicon

Valley is not in the growth of existing firms or even in the birth of new industries; this has been repeated occurrence, witness Detroit for autos, Pittsburgh for steel, and Los Angeles for entertainment. The difference in Silicon Valley is that it has developed a network of organizations specialized in the creation of new firms. If the economic space is sufficiently large and the new firms can effectively organize to distinguish themselves from other firms, then they can evolve their own industrial cluster [5]."

Although these works try to define the Silicon Valley in different perspectives they all agree the effect of the social environment. I will look at another aspect which could be significant to analyze. In my opinion what distinguishes the Silicon Valley from other high-tech areas, one can say that it is the high number of startup companies. Startup companies are small-scale firms with 3 to 40 employees. They first start with self funding by a few people and then raise money from investors to become a company. Initial phase which is to bring the idea into a first phase of the product is important. It requires hard work to process in the initial phase and most of the initial startups have started from the garages of the houses to save the budget. The garages provided a free and convenient place for entrepreneurs. This kind of house structure is unique in US especially in the Silicon Valley where one or two story independent houses are preferred due to the earth quake zone. Garages provided free office space for whom would like to work on something besides their regular jobs.

2.2 Silicon Valley and Route 128

Route 128 represents another approach to regional technological development in U.S. The comparison of Silicon Valley that has worked on the formation of information technologies after World War II and Route 128 is important to show which strategy will have a long term success [29].

Although Silicon Valley and the industry site surrounding of Boston, known as Route 128, works on similar technologies (electronics), there are substantial differences in formation, growth, life styles and relationship among firms. Like Silicon Valley the electronics companies in the neighborhood of the 65 mile road around Boston and Cambridge has used the creativity of the students of world wide famous universities like MIT and Harvard to learn more about world with support by government (Department of Defense and Central Intelligence Agencies). Furthermore, it gave these universities a chance to test the theses submitted to them. In order to market the technologies which succeeded, new companies were founded and an industry region was formed around that route. MIT pioneered hundreds of technological venture and big corporations (DuPont, Kodak, and Xerox) were structured with its collaboration.

Federal government contributed to this venture a great deal of resources. At the end of cold war, the state of Massachusetts ranked number one in transferring the sources. Also the Department of Defense provided funds for the 60 percent of the research. As a result of this governmental funding big companies had an opportunity to become bigger and stronger. NASA and Department of Energy financed billions of dollars that resulted

in the formation of thousands of business spanning the computers to biotechnology [29].

The last step in this formation was the support that came from corporations. In 1990 Massachusetts had 3000 technology companies in its territories. The outcome was the growth of the side industry, examples of which are; DEC (digital equipment company), Raytheon and Lotus.

According to Saxenian's research, the conservative quiet life style of Boston differs from Silicon Valley. Unlike Silicon Valley, the company employees did not discuss megabytes and new technologies at dinner; they prefer talking on subjects other than work. In Boston, the successful founders of the companies did not change their life styles and their cars but preferred to stay at their previous houses and use their old cars, in complete contrast in Silicon Valley where the people who started earning more money tried to show that they had money through affluent life styles [50].

The slowing down on the formation of new companies in 1970's and 1980's was a result of not having a leading role model who was rich and making connections among the powerful people in the society. Military purchases of the army forced companies to divide rather than join their efforts with other companies. Guaranteed funding led companies to survive independently rather than operating under composed policies.

Route 128 diverges from Silicon Valley on hiring people for administrative positions. Unlike Silicon Valley, instead of new young people, they preferred people close to the owners of the company for principal positions. The control mechanism does not

belong to examination, management or venture capitalists as in Silicon Valley. Hierarchal deployment of the companies leaves the last decision to owners.

The formations of companies reflect a hierarchy and employees work too hard to move on this hierarchical structure. In hiring employers acted more cautiously towards people that worked at certain companies. In complete contrast to this, Silicon Valley employers willingly hire those who left other companies as experienced workers. Hierarchy asserted itself on salary, rank and title [29].

3 Mechanism of the Valley

3.1 Social Infrastructure

The structural organization of Silicon Valley also added positive growth on the Valley. The companies often founded among friends, later divided and formed bigger firms. No matter how big the competition among the companies was, they continued on exchanging ideas. The common characteristic of people working in Silicon Valley is not afraid of taking technical challenges. People who were not shy to work on their garages are now the owners of international corporations.

3.2 Indirect Roots of Government Spending

Government spending was crucial in the Valley like in any other technology park. During and after World War II, the Valley attracted government spending in terms of integrated circuits and Aerospace industry. We can consider these direct roots of government spending, but indirect roots of government spending has helped growth of the Valley throughout institutions and laboratories. Universities received funding for defense projects and the technology and information created in the institutions frequently ended up in the Valley as startups or in the form of qualified workers.

Government spending in this sense is important for the Valley. Although new technologies are created in the Valley by high-tech companies, the vital source of the new technology, workers, are trained at these universities. Another impact of defense spend-

ing is at the projects assigned to institutions often result in new technologies with civilian applications. This kind of projects normally do not attract initial company funding but companies use the results when the technology proves to have commercial applications.

For an entrepreneurial cluster proximity to research universities is very crucial. Most of the fundamental research in electronics industry has continued by the institutions [7]. This research was undertaken in an open environment which enabled free flow of information [5]. With the great funding to support graduate and post-doctoral students, many of whom subsequently continue their work in university, in industry, or in a spin-off (a startup). The universities formed an excellent harbor for startups in terms of collaboration and recruiting highly talented students overseas. The universities choose the brightest students who would then be recruited by the firms and government provides visa to let them work in the Valley which is an indirect promotion of the high-technology by the government.

3.3 Venture Capital

The main factor in economical reconstruction is to invent new product and new technologies and then to present it to the consumer. You cannot find a book that contains the information about how to turn a bright idea into a real product on the market. Venture capital forms the skeleton of this process and makes a great contribution to American financial system. Venture capital industry invest on ideas to make them a product. They

found firms but what they provide is more than money since they involve in the organization and decision making. It is risky since they invest only to an idea and the added value the venture capital firm provides is substantial for the company. As a result, the profit they expect is ideally several multiples more than they invest in the start up. The venture capital model started to be copied by other nations. Microsoft, Genentech, and Federal Express are examples of successful venture capital investments.

The people who need venture capitalists are the ones who want to turn a good idea into a product. For instance; if a person whose working subject is Internet has an idea and belief that if he works on this subject he can earn money, the first thing that he has to do is to refine the idea, develop a business plan, establish a group of people to work with him and then attract enough money to form the basis of a company. Venture capitalists come on the scene at that moment and become investors in the company by providing capital to the entrepreneurs if they think that the idea will be economically profitable. Venture capitalists does not have to become partners during the starting of the company, they can also join a company to help its growth after the formation stage.

The companies which have great money requires venture capitalists but venture capitalists do not only finance the company but also take part on deciding the long term strategy for the company.

3.3.1 How venture capitalist operates!

Venture capital firms usually have 6 to 12 employees. By the year 1996, a venture capital firm averaged control of 50-99 millions of dollars. Nearly one third of them have money volume of 25-250 million dollars. The resources of venture capital come from mainly banks and insurance companies, trust funds, pension funds, retirement funds and from individuals [11].

It takes a long negotiation process for a venture capitalist to settle with a company or an entrepreneur. The entrepreneur knows whether the venture capitalist will draw back and become a passive investor after making the investment or be an active force in the administration of the company. During the interviews between venture capitalist and entrepreneur, the subject of profit is second place. Unless there are major administrative irregularity, venture capitalists do not take an active role. One of the partners of venture capitalist works individually with every company. The person has an average of 20 meetings, and 100 hours of either phone or face to face conversation with the company owners.

3.3.2 What VC offers!

VC helps to attract and maintain high caliber management personnel. Venture firms need specialized networks and connections and ability to convince high level executives to leave their current well paid jobs to join the firm which is not an easy task and a good VC comes into picture in this context.

The strategy of the firm needs to be critiqued considerably and the venture firm should be able to act as a third party who can rationally assess the advantages and disadvantages of new strategies presented by management. From the development of the strategy to the implementation, venture firms help and act as a final arbitrator in disputes.

Venture firms, creating and maintaining an entrepreneurial environment in the company, open doors to the decision makers of potential customers and provide insight.

3.4 The control mechanisms

3.4.1 Management of Fund

Venture capitalists do not let firms use all the money in the first round, they give the fund in stages. The entrepreneur only gets enough money to take him to the next round. This method enables the venture capitalist to distribute the risk. Every round needs thorough thinking and only they get the next round of money if the performance in each stage is accomplished.

The venture capitalist is involved of the future of the company if they cannot reach the performance criteria. These decisions may involve revising the strategy or changing the management structure and/or leading of the company. As a worst case scenario they stop negotiations and move on to another entrepreneur. If the venture capitalists decides on giving more money, they will typically demand an increase on the amount of the company stock they own.

3.4.2 The management of companies stock and real estate

Venture capitalist makes an investment in return for stock and real estate. The idea behind this is really simple, by doing this venture capitalist has more power on the company; further more it forces the venture capitalist to have a positive influence on the company.

Venture capitalist usually gets hold of preferred stock and like a rental agreement that requires payments on certain intervals. Another characteristic of these stocks are they will have payments prior to ordinary stock holders. This technique prevents the entrepreneur to pay himself a high salary and if everything goes bad and bankruptcy occurs, it allows the venture capitalist to take its money earlier than the entrepreneur. Furthermore the venture capitalist has the option of changing his stock into money prior to anyone. These all provide the venture capitalist to have an opportunity of more control and an easy way out if the project turns into bad.

The value of the company in the stock market are the indicator of harmony of the relationship among the entrepreneur and venture capitalist. If the venture capitalist is hopeful of the future of the company he starts collecting the stocks in the market thus he increases the risk on his capital and makes it harder for him to leave during bankruptcy but at the same time he provides positive influence on the company and has more profit.

3.4.3 The company going on public

Venture capital as a shareholder considers growth and profitability of the business. The VC's return is only relevant when the VC"exits" by selling its shareholding when the business is acquired or go on public in the stock market.

1. **Ending the relationship with the company:**

   The main concern of the venture capitalist is to leave the company in a profitable way. Under normal circumstances venture capitalist finances a company for 3-5 years and then if the company is successful it either is acquired by another company or goes public. A research done by Sahlman show the profit of a company going on public is 60%, the company's earnings is 15% and in a state of bankruptcy VC's loss is 80%. As mentioned before a venture capitalist has the most profit when a company goes public, and also this gives the venture capitalist fame for their success. VCs with success have no difficulty in finding new funds.

2. **Company's market value:**

   Investors have difficulty in valuing the performance of the company. It is not so easy to determine the performance of a company because it is hard to find an equivalent company and compare them. Investors demand an objective evaluation mechanism. The best way to achieve this is to see how the stock market will value their stock.

3. **Venture capitalist's heading for new companies:**

After a company goes public or being sold there is no need for the venture capitalist to finance it. They will have less administrative responsibilities. It is proper to head for a new company after an average of 5 years in the company.

Although it may seem like a good thing for the venture capitalist to have a company go public as early as possible, it may cause big mistakes. Investors are usually called as patient investor like retirement funds. Although they are labelled as patient due to the demand from the society for money they put a lot of pressure on the companies to go public. If an investor does not want to go on funding a company, a premature going public occurs which usually happens to an inexperienced venture capitalist and it gives harm both to the investor and venture capitalist.

All these pressure on the venture capitalist impels the venture capitalist towards companies on their last stage. Thus they do not pick entrepreneurs with good ideas who are in early stages of this process.

Besides when a company goes public, rather than taking all its money venture capitalist leaves certain amount of it. As an average a venture capitalist who owns 34% percent of the company stock decreases this into 24% after the company goes public, and a year later it decreases down to 17%.

When a venture capitalist designs an investment, it takes the next 10 years into consideration which has another 3 years of extension period. This long time interval helps the venture capitalist to think carefully and lessen the pressure of

the investors.

As a result, we can summarize the characteristics of venture capitalists under two headings. First of all venture capitalist, different from other intermediate institutions, is responsible for the financing of the company. It is a partner of the company and takes risk. Secondly, venture capitalist is also responsible partially for the business administration and development of the company.

3.5 Off-shore development

Off-shore development involves looking closely at the technology that compose the projects and its functional units, and then working with engineers to outsource these functions. Such functions as software, debugging, testing, subparts can be outsourced. The outsourcing provider then administers these functions on their own systems to agreed service standards at a guaranteed cost.

Companies that move their technology functions overseas benefits from the special advantageous of the countries such as low wage, tax reduction, etc in expense of destroying jobs. Typically, companies headquartered in the United States contract for employees in India, and increasingly in Israel, Ireland, China, or Russia, [13].

Offshore outsourcing is very common in Silicon Valley as a central for high-tech companies. It is a way of creating connection to other countries. Some parts of the projects are outsourced and administration of the project are done by phone calls, project meetings and a new way of information exchange is created among the technol-

ogy parks of different countries. In addition to the productivity increase, outsourcing also brings new fresh information and talent to the Valley. One-third of engineers were born in foreign countries [14].

3.6 Description of Startup Industry

Creating companies with VC funding is a way of proliferation the workforce in the Valley. Silicon Valley is home to over 20% of software and hardware companies in the world and average of five companies go IPO (Initial Public Offering) per year [14].

A startup is teaming up around a product idea. Team formation is crucial before and after getting funding since VCs fund the company if the team is promising and team determines the success of the company. Harmony is crucial among workers.

Of course without a idea, a team is nothing. Exciting product ideas ignites the startup and whole purpose of hard work is to convert the idea into a commercially valuable product. Funding is expected to be acquired from VCs. Before going to VCs, the startup may be angel funded that is a self-investment or finding investment opportunities with some personal networking. Angel funding is necessary to bring the idea into enough form to present VCs. If VC finds the idea profitable they fund the startup. Venture capitalists bring startup companies capital, management, and connections.

A staff at a startup gets salary and stock options. Stock options means the right to purchase stock at a set price. If someone joins the company before it goes public, then a worker can be granted pre-IPO stock options. Pre-IPO stock is extremely speculative

and could not be counted as income. Employee Stock Purchase (ESP) gives advantages to employee to buy additional stock at a discount. Discount can be set to the lowest price that the stock reaches on the stock market during a six-month period [15].

Startup is ended by going to IPO or selling to a bigger company. If the startup is not successful then VCs stop funding and in all cases VC has the first priority to acquire their shares.

4 Future direction of the Valley

4.1 Recent history of Silicon Valley

4.1.1 Every boom is followed by shrinkage

Historically, Silicon Valley has experienced several boom-and-burst cycles. Economists have argued intensely about why this happens; new technologies bursting the chain of inventions are usually not homogenous but rather in groups over time. Entrepreneurs find funding for their products and if they become successful, a group of similar companies arise and economy starts to expand. Vast amounts of products are released into the market which results in marking down the prices, and with the increase in the sales, the profit margin also decreases and stagnancy begins. This state occurs as a natural outcome of wealth over expansion.

4.1.2 Cycle of new technologies

In a new technology first economical burst starts dropping after excessive amounts of entrepreneur and venture capitalist rush into the same area but it is followed by a new spurts as they start to use the technology in other areas of economy.

4.1.3 Habitat

For an innovation one must provide not only a suitable habitat but also maintain the stability in the habitat. The habitat of Silicon Valley had a breakdown after the burst

of Internet industry. The sudden increase in job opportunities caused migration to the area which triggered an abnormal increase in the real estate prices and problems in transportation. A worsening of those life conditions resulted image of Silicon Valley as a difficult environment. One must consider the social health of a society if he wants innovative thinking to bloom. Also if the region has good quality in education, cheap housing, and easy transportation it will help the people living there to use their talent in maximum.

4.1.4 The change in Silicon Valley with the new economy

The conception of economy in Silicon Valley has been there since the 1930's. It began to redefine itself in 1980's and 1990's with the change in the global economy due to new technologies. The conception of economy remitting from the new paradigm have been identified by Stanford University's Dr. William F. Miller as global information, information distribution, foreign investment and formation of regional groups related to the technology and industry. Dr. Miller explains the difference among the old and new concept as;

- Old global economy aims to invest in places with cheap labor and low cost and then use these places as exportation platforms and have massive production.
- New global economy is in search of high technology, qualified employees, researching and improving new technologies, capability of being marketable, all with the help of global social networks.

Today's economy develops through step by step interaction. An invention emerges as a result of chain reaction. The process that begins in a research lab, progresses to the development phase. It is sent to the factory which later turns into a product that is ready for the consumers.

Now, that we have Internet, this interaction among people will not take distance into consideration. Internet will help people meet and discuss on subjects without leaving their home or office. Information transfer will have no boundaries although with the limitation of intellectual property the subject areas of working and methodology will be conveyed easily. Sharing values compared to old economies, hiding the ideas is no longer a valid response in the new economy. Today often an innovation arises as the result of collaborative study amongst different universities or different companies rather than being the sole work of one company. The key idea behind this is to share the information, provide trust and show the talent to be able to share the upcoming wealth like partners.

4.2 Future Direction of the Silicon Valley

Next Silicon Valley is open to significant opportunities driven by bio-, info-, and nanotechnology. These are expected to create new industries and transform the existing industries. The atmosphere was inundated with the Internet and dot.coms in the 1990s which are the result of convergence of hardware, software and multi-media. Next convergence will be result of biotech, infotech, and nanotech. The convergence of these

three technologies will drive a revolution in how people live and work and cited in [3] as follows;

> "Bio" is the utilization of chemistry in life to not only understand living organisms but to manufacture all types of things that we have in our environment. "Info" is the harvesting, storage, and transmission of information about our environment in all sorts of ways. And "nano" is the control of matter at the scale where basic material properties are determined.

The Valley experienced several waves before but the waves are speeding up since the world becomes even more interconnected [3]. That is why now three waves are ridden simultaneously and sometimes competing with one another, but very often interacting and reinforcing one another.

These new waves will create new opportunities for other countries to connect to the Silicon Valley. The advantageous of countries and how ready their models to new wave determine the direction of the possible strong bonds.

5 Understanding the Models

The Silicon Valley is fertile ground for developing partnership with venture firms and international technology leaders. The diffusion of high technology has been global. The introduction of new information technologies has however followed different patterns in different countries. Thus, the societies have preserved their unique features in production processes even though the adaption of high technology has included also the borrowing of diffused and common organizational forms.

The success of Silicon Valley has been investigated and absorbed by many countries. They either built their own models to do competition or they went to a model that leverages the Valley. India, Israel, Ireland are the good models for the latter.

India gained 80 percent of the outsourcing market of US and the rest is divided between Israel and others. India has become the software base in a considerably short time interval. There are several factors that led to such success. When we analyzed the success, key elements included networking, ability to speak English, and lower wages. But they are not enough and sometimes not necessary either since neither Israel or Ireland has enough diaspora but they are quite successful in outsourcing the technology jobs from US.

5.1 India

India has taken several actions over the past decade to become high-tech state. India Institute of Technology has sought to cultivate engineers in high technology to level up

the India's high tech industry but over time it could not prevent students from pursuing higher degrees or working in the US. But, the government became the promoter of this process when the graduates came back to India to open new tech companies [32].

The Indian high-tech industry is concentrated in Banglore. Banglore is in the state of Karnakata and known as the Valley of India. During the liberalization period, the state of Karnakata established a software industry and now the annual growth rate become around 40 percent. India exports 63 percent of its software goods to US, 22 percent to Europe, and 11 percent to Asia. The main logic of India's software industry is to establish outsourcing contracts with the major US companies. Offshore development is around 62 percent with US. When we look at the software industry there are companies with percentage of every scale from small projects to big projects. This helps to reduce the size of the project and address India a good candidate for future contracts.

If we examine the success of India, we at the first place see the education. When skilled workers meet with the Indian diaspora in US, it has tethered the off shore development. In the beginning, India contracted for low skilled jobs and admired by US for their low wage condition. Low skilled contracts are mainly testing or coding. These kind of work is defined contracted out easily where there is no need to have professional help. The success of India on low skilled projects made India a candidate for bigger projects. To establish a contract with US firms, India used its diaspora in US which is present in every aspect of the industry. The idea of off-shore development

aroused when there is a need to get a help from outside to speed up and reduce the cost of the process. India appeared to be a good choice since firms were attracted by Indian engineers or low wage condition. Of course another aspect is English speaking ability, US firms sought English speaking workers since they need to communicate often. Software projects compared to hardware ones evolve with time meaning that they are debugged or developed over time and easily changeable[3]. The location of the India is also leveraged by the US companies since it is in the morning when US is at night. When the shift is over the project is taken by the India and continued 24 hours without interruption.

Venture capitalists paid attention to Indian's success and India has started to move from low skilled jobs to high skilled jobs and products to some extent. The government comes into picture by providing tax free environment to Indian firms. The loop is created to spend the profit again to the same sector. Government has recently established ministry to regulate software industry and create quality standards.

India's software industry has several benchmarks such as craftsmanship, better production, applied research and development. There are still some weakness: the government's support is still at the low level and infrastructure is not adequate in terms of providing electricity without block out. Indian's domestic market is weak making the country very vulnerable since any competitor can decrease India's share and limit to the domestic market. India is also trying to standardize the software industry and certify its

[3]For this reason India has succeeded in software and China has succeeded in hardware. Another reason why hardware choose China not India is India's inadequate and unreliable infrastructure.

companies.

5.2 Israel

Israel had a history of technology-based entrepreneurship that began in the early 1970s. And before the mid 1980s, US venture capitalist went to Israel and formed the first venture capital fund, that the Israeli high-technology cluster began developing critical mass. Close links with the Silicon Valley and availability of venture capital ignited the Israeli Silion Valley [5]. Israel became second region after Silicon Valley in powering a dense population of high-tech companies. Israel is home to some 2,000 high-tech startups. Israel boosts its high tech sector by the defense spending. The military invests billions of dollars in advanced technology [16]. Defense industry has several innovation and they target Silicon Valley as their market. Entrepreneurs often found a company in US and outsource the R&D to Israel. This brings some advantages; first, it is reliable for VCs and networking is more direct. Second, company is opened to public in US stock market and this is preferable for Israel's entrepreneurs since Tel Aviv stock market is so bureaucratic [21].

The Israeli government has also taken some facilitative actions. Israeli banks have partnered with the Valley's venture firms. The government provided policies with tax reduction and subvention. The Israeli government has moved its attache of trade from San Francisco to San Jose. The attache helps to build social interaction between US firms and Israeli entrepreneurs.

Israeli model consist of highly educated high tech workers, high institutions, government agencies, venture capitals, social networks, and matchmakers.

5.3 Ireland

Ireland has grown faster and created more than high-tech related jobs from other OECD members over the past decade, helping of him shift from a traditional agricultural economy to high technology. The city of Dublin is addressed as the Valley of Ireland. Ireland similar to Israel has less population compared to India but has a highly educated and skilled population percentage wise. There are 600 Irish companies in Silicon Valley and a growth rate of 50 companies per year. Government plays an important role in the Ireland's success. Although the success could be related to Ireland's membership of European Union, the real roots relies on active role of government in the organization of high-tech industry. The Ireland government attracted the international capital which boasted the high tech industry [39].

Starting from 1970, the government started to ease investment for foreigners. The 10% tax rate is very low compared to Germany (37%). The special condition of Ireland has attracted international companies and some have relocated their European center to Ireland[4].

In the last decade, 1200 companies invested in Ireland. On the other hand, Ireland

[4]"Microsoft, which bases its European operations in Ireland, and Intel, whose largest offshore manufacturing operation are based in County Kildare. Since 1985, Microsoft's Irish operations have grown and developed to the point where Microsoft Ireland is the single biggest employer in software in Ireland. Meanwhile, Intel has invested around 3.2 billion in building the most technologically advanced industrial campus in Ireland, another 2 billion expected by February 2004 [43]"

responds to this massive workforce need by 400 graduates in computer science and electrical engineering per year.

Ireland is identified by its young and educated population among European nations. Government has invested substantial amount of funds to education since 1979. Computer aided courses has been increased in universities which returns new knowledge[41].

The innovation and location are closely related. Innovation debuts near the technology. In Ireland it is impossible to be far from major research universities. In order to help its development, the government established institutions like Ireland's Institutes of Technology and National Institutes for Higher Education. These institutions provides services in education and funding to proliferate innovation. Over the time, the private sector has overtake the government institutions.

Another role of the government was to be the venture capitalist in 1990s. The lack of venture capitalists has been closed by the government support. In 1998, the Irish government has established "Enterprise Ireland" as a venture capital firm and created 15 different funds in different technology sectors. The amount is still less than that of in US but still enough to create waves in Irish economy.

Starting from 1980s, the Irish economy has run under tight budget in order to accumulate technology funds. And also the infrastructure has been updated to deploy networking widely.

Between 1990 and 2001, the Irish economy has a growth rate of 48 percent and it become the second country globally in software export [40].

According to the Ireland-Tech Cluster Analysis [43];

"Ireland presented the right conditions for the development of an information technology sector at a time when there was great demand among companies looking to invest outside their own borders for areas of the world with favorable macroeconomic environments.

There's always the fear that multinational companies's will move their business to a country that can provide better incentives. The government needs to keep the lines of communication with IT multinational open at all times, also keeping a watchful eye on competing countries to ensure Ireland remains the favored location for European IT operations."

5.4 Others

China Taipei, Cambridge, England, Hamburg, Munich, Stockholm, Japan, Russia, Philippines, Ankara, and Istanbul are also the countries that are beneficiary of the offshore technology explosion especially on software. China is making substantial investments in its software industry after its success on hardware now, Philippines is getting a growing share of the technical support since English is spoken there.

6 Discussion of Models

The Silicon Valley possesses assets that are critical to economic success, entrepreneurial culture, capital and people [3]. Benchmarking the Valley is a way to understand the high-tech successors of the Valley. The Valley has been successful because it is a habitat filled with creativity, entrepreneurship, education, and trust:

- Creativity

  Creativity requires close interaction between companies and institutions in order to keep the competition at the highest level. Close interaction make available flow of information and the sharing of knowledge which together boast the competition and innovation.

  Environment is crucial for creativity since creativity is composed of productivity success, product development, technology transfer, intellectual property, market success, R&D, standardization, networking and analyzing the competitors. The right environment for creativity should preserves these characteristics, First the environment should foster this creativity. Second management should create the right working conditions to make the company competitive and innovative. Last, acquiring information is kind of feeding the creativity since it is necessary for creative minds.

- Entrepreneurship

  The Valley should often harbor a special habitat for innovation and entrepreneur-

ship. The components of an entrepreneur are taking challenges, having passion, and bringing innovation. An entrepreneur in high tech industry develops for an idea and goes after it to turn it into a product. The Valley has provided conducive conditions for entrepreneurs by providing entrepreneurs dense and flexible networks, university researchers, lawyers, consultants, highly skilled employees and others. Having appropriate institutions is an easy way to acquire information and work force. Recent university graduates are the best possible employees for the startups since they can take challenges compared to other employees in the companies who have jobs already. These complex networks continually connect people to good ideas [3].

- Education

  The Valley should be able to create the education and training programs to meet the technology. The Valley should be able to prepare residents from the current wave to the next wave and then the next wave will be an inclusive wave of shared prosperity and lifting the standards for everyone.

- Trust

  The Valley should be able to create a fluid work arrangements and lasting bond of trust to sustain a high level of innovation in the years ahead.

We see that these components are somehow available in India, Israel, and Ireland. What makes them successful is their initiative to form their workforce in a manner

complementing towards the high-technology in the Silicon Valley.

Huge population of India has kept the wage lower and created a special habitat for the Silicon Valley industries. Making connection is easier than other countries since India has a diaspora already employed in the Valley running the projects. Constant communication between India and the U.S. is present due to the fact that Indian workers are English speaking.

Israel on the other hand as a new state centered its high-tech industry with a huge defense spending. Defense spending created the institutions and number of innovations which later resulted in founding related startups. Having a substantial highly educated workforce and conditions for technological advancement, Israel stimulated technology transfer to commercial markets. They established connections with US venture capitalists and brought the "Israel model" into the Valley. The Israel model is founding startup in the Silicon Valley and outsourcing the R&D to the Israel. More companies go IPO in Nasdaq and overcome the bureaucratic difficulties of the Tel Aviv stock market. This model also includes matchmaking associations which they bring together Israeli entrepreneurs with the Valley's industry.

Like Israel, government support is also present for Ireland. Ireland took a different way to utilize its power and created its own venture capital system. The government also made Ireland attractive for overseas investors and have them invest in Ireland. As a small country, it invested more on electrical and computer engineering education to support the work force demand.

Crucial ingredient in Ireland's success is education which make them synched with the riding technology in the Valley. They supported the educated work force with institutions and associations to create a habitat for entrepreneurs. Entrepreneurship is strengthened by indirect government support and associations to set up connections with venture capitals and oversees industry. The circulation of workforce helps to enlarge the network and feeds the innovation.

7 Conclusion

Silicon Valley has created innovation over the last half century. From the vacuum tubes to the integrated circuits and then from the personnel computer to the Internet, it stays the center of the high tech industry. The economy of the Valley showed boom-and-burst cycles, the last cycle was information age which brought the far to the near and incubated the migration of the software industry to overseas.

This phenomenon is not uncommon to the Valley. During the 1970s and 1980s, most computer and semiconductor manufacturing operations fled the United States for places such as Taiwan and Southeast Asia. Yet the Bay Area's influence as a tech center continued to grow as factory jobs were replaced by engineering, marketing and management positions. According to Chris Brahm, what is happening in software is very analogous to what happened in manufacturing.

We see that some countries such as India, Israel and Ireland showed greater success than the ordinary when harboring the overseas projects. India provided low wage skilled workers and leveraged its diaspora in US to make connections. Israel boasted its high tech industry with extensive defense spending and then used the technology created to form a private technology sector. Ireland on the other hand attracted investors to create low tax zones and government formed artificial venture capital industry to fund entrepreneurs. They all give higher priority to establish institutions to feed the habitat for innovation.

We can conclude that, in the case of the nations other than US, the government

played a more significant role in creating the conditions in which entrepreneurship could begin however in each case the governments were careful to not become overly involved in the actual dynamics [5].

We can conclude that the ability for entrepreneurial success in other parts of the world proves that the entrepreneurship is not unique to the Silicon Valley since it is the institutions and human knowledge that ignites the entrepreneurial clusters.

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