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Entrepreneurial leadership in sustainable innovation adoption: A case study of the Silicon Valley's firms

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Abstract:

The development of Silicon Valley, reinforced by leadership support that made it possible for the region to become a world innovation hub, attracting and circulating talent and technology, internationally and expanding the innovation dynamic and fostering growth firms. Intellectual leadership behaviors development and attraction is the most important factor for Silicon Valley's success. In this context, the increasing dependence of Silicon Valley on leadership entrepreneurial skills and technological innovation adoption is a potential for envisioning and advancing their firms. This paper is attempt to explore the design principles of such innovation-support mechanism and determine the more elusive ingredients for their success. Our research focused on delineating a model of Silicon Valley's sustainable innovation adoption from an analysis of region and comparisons on specific issues of interactions emerging to solve problems and taking regional development forward.

Keywords: Silicon Valley; Entrepreneurship; Leadership; Sustainability; Innovation

الملخص

تنمية "سيليكون فالي" من خلال دعم القيادة أتاح للمنطقة أن تصبح مركزًا عالميًا للابتكار ، وتجذب المواهب والتكنولوجيا وهذا على الصعيد الدولي كما استطاعت توسيع ديناميكية الابتكار وتعزيز شركات النمو. يعد تطوير سلوكيات القيادة الفكرية وجذبها أهم عامل لنجاح "سيليكون فالي" . في هذا السياق ، فإن الاعتماد المتزايد ل"سيليكون فالي" على مهارات ريادة الأعمال القيادية واعتماد الابتكار التكنولوجي هو ما سمح بتطوير شركاتهم والنهوض بها. تهدف هذه الورقة إلى استكشاف مبادئ و آلية دعم الابتكار هذه وتحديد المكونات الأكثر أهمية لنجاحها. ركز بحثنا على تحديد نموذج لاعتماد الابتكار المستدام في "سيليكون فالي" من خلال تحليل المنطقة والمقارنات حول قضايا محددة من التفاعلات الناشئة لحل المشكلات ودفع التنمية الإقليمية إلى الأمام.

الكلمات المفتاحية:سيليكون فالي؛ ريادة الأعمال؛ قيادة؛ الاستدامة؛ ابتكار.

Introduction:

Silicon Valley is a regional innovation icon that attracts researchers and policymakers from across the world, seeking to understand and emulate its success. As such, entrepreneurship is an important element of Silicon Valley's innovation system. Furthermore, behind contemporary Silicon Valley, there is a history of indigenous academic entrepreneurship and leadership supported R&D, as well as importation and reinterpretation of ecosystem elements like the venture capital firm for sustainable innovation adoption. The Silicon Valley has expanded from a local generator of new technologies and industries into the key node of a global network, with multi-national firms, countries, regions and universities maintaining outposts to market or source advanced technologies. In particular, the purpose of this study is to provide an overview of

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entrepreneurial leadership skills and activities to determine its contribution of sustainable innovation adoption in local businesses. How can leaderships play this role in the Silicon Valley firm's? This study provides a snapshot data based on analysis of the 2021 calendar year through an overview of the Silicon Valley's firms by analyzing the key issues and questions throughout the innovation journey.

1. Theoretical framework:

1.1. Entrepreneurial Leadership:

Theorists differ in their philosophies on what constitutes or creates entrepreneurial leadership. The vision or "foresight" that discovers "the potential of certain markets, technologies, products, or services" is an entrepreneurial skill that defines the initial creation of entrepreneurial leadership (Baum, 2004). Some scholars may argue that entrepreneurship is just leadership in a special context... (Vecchio, 2003). The basic premise of entrepreneurship research is that the entrepreneur (who is at the same time the leader) influences the success of a new enterprise through his or her risk-taking tendency (Stewart, 2004). Entrepreneurial leadership is defined as a kind of ability to create Visionary scenarios used to gather and mobilize participants' "supporters" who are committed to the vision, discovery and utilization of strategic value creation (Gupta, 2004).

In this context, entrepreneurial leadership is define as « Influencing and guiding the performance of team members to achieve these goals Organizational goals related to identifying and exploiting entrepreneurial opportunities » (Renko, 2012). In some cases, entrepreneurial leadership comes into play to play a strategic leadership role, that must rely on organizational behavior and psychology knowledge And strategic management field (Bonardia, 2018).

At the same time, entrepreneurial leadership also affects innovative work behavior and Opportunity to gain recognition in a high-tech company (Bagheri, 2017).

In summary, a good leader must possess some qualities in order to improve the affairs of the organization; some of these qualities are as follows:

- *Ability to be objective*: Leaders should check every situation before making a decision. Objectivity is the ability to view problems and problems rationally or objectively without prejudice.
- *Ability to be perceptive*: This requires being able to observe or discover the reality of a person's environment. Leaders in an organization need to understand the goals and objectives of the entire organization so that they can work hard to support those goals.
- *Ability to establish proper priorities*: The ability to recognize what is important and what is not. Leaders need to know which alternatives are worth considering.
- *Human relations*: This is also called interpersonal relationship. The leader's interpersonal attitude should be very strong, especially when his work is done through his subordinates. Cultivating and understanding proper interpersonal skills will win the healthy respect of leaders. It is believed that based on the theory of interpersonal relationships, work should be designed and arranged to ensure that the work provides workers with a meaningful sense of work responsibility and opportunities to participate in decision-making that affects their work.
- *Crises manager*: Leaders should be able to resolve disputes or disagreements between employees, as well as issues that affect employee output.

Effective decision: The manager's ability to make strategic planning depends on his effective decision-making. Effective decision-making in contemporary management involves defensive avoidance, collecting more and more information about the cost and utility of each alternative, and systematically comparing them to choose the most effective cost (Daniel, 2019).

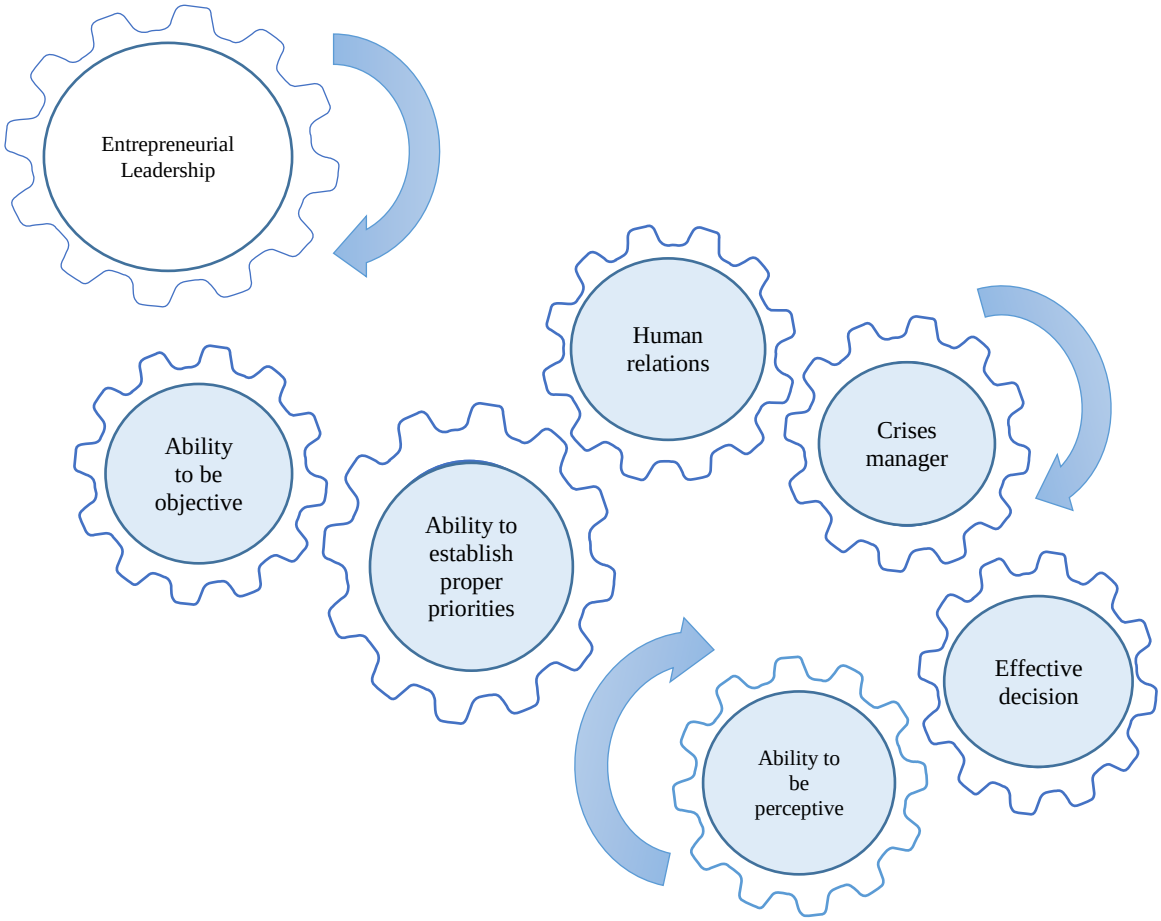

Figure.1: The characteristics of an entrepreneurial leader (Daniel, A.U. 2019)

1.2. Sustainable Innovation:

The concept of sustainable innovation consists of improving current welfare while effectively distributing resource endowments for present and future generations (Maier & al, 2020).

In order to achieve sustainable development, companies need to innovate through the development of resources used for product improvement and exploring new technologies to develop new products and so, developmental innovation and exploratory innovation are contradictory. Innovation paradoxes often appear when actively pursuing (only) operational excellence and incremental innovation the possibility of creating breakthrough innovations is ruled out (Davila & Epstein, 2014).

More importantly, the product sustainable innovation ecosystem includes four stages: idea generation, research, development, and commercialization (Hermann & Wigger, 2017).

Additionally, there are three characteristics in the sustainable innovation ecosystem: value logic, participant symbiosis, and institutional stability (Lauritzen, 2017).

Hansen (2009) observed that sustainability-oriented Innovation is a tool that covers sustainability issues and new customers and market segmentation, thereby adding positive value to the company's global capital.

For Boons (2009), sustainable innovation needs to go beyond incremental levels because Sustainable development requires changes in production and consumption systems. Therefore, Sustainable

innovation needs to transcend the business environment and be valued by society, thus companies can invest in radical levels of innovation and establish new logic for sustainable development.

2. The role of entrepreneurial leadership in sustainable innovation in Silicon Valley firms:

In this study, the role of entrepreneurial leadership in sustainable innovation adoption is measured in Silicon Valley firms by indicators of The Silicon Valley Index (SVI 2021). All of the Index data is also available online at www.SiliconValleyIndicators.org. This interactive data hub provides charts and access to the underlying data, links to data sources, and additional related online resources.

The Silicon Valley Index (SVI) is data and charts from the Silicon Valley firms (presented by the Silicon Valley institute for regional studies) are available on a dynamic and interactive website that allows users to further explore the Silicon Valley story. It has been telling the Silicon Valley story since 1995. Released early every year, the Index is a comprehensive report based on indicators that measure the strength of the economy and the health of Silicon Valley's community; highlighting challenges and providing an analytical foundation for leadership and decision-making.

An Indicator is a quantitative measure of relevance to Silicon Valley's economy and community health that can be examined either over a period of time, or at a given point in time. Good Indicators are bellwethers that reflect the fundamentals of long-term regional health, and represent the interests of the community. They are measurable, attainable, and outcome-oriented.

The Silicon Valley index (SVI) aims to foster the knowledge base on the state of play and evolution of Employment; Income; Innovation & Entrepreneurship; Commercial Space; Local Government Administration; Civic Engagement.

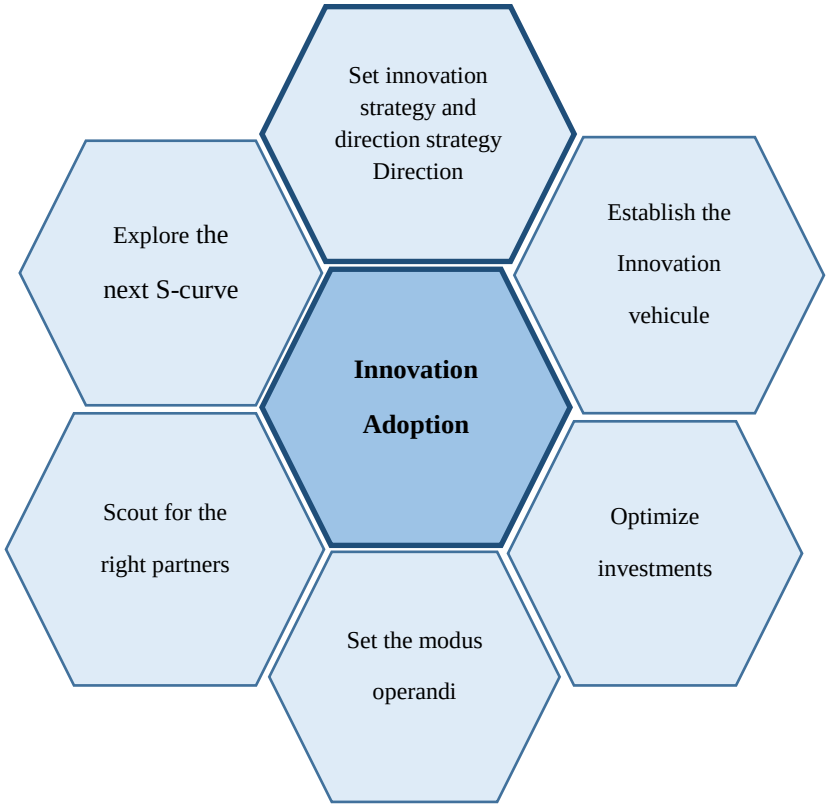

Figure. 2. Executives face key issues throughout the innovation adoption (Delloitte University, 2016)

The SVI platform provides a monitoring mechanism to examine key trends in sustainable innovation. It offers a unique insight into statistics and initiatives to support innovation adoption, as well as reports on key industrial and technological opportunities, challenges and policy initiatives related to sustainability.

As a general hypothesis, enabling factors for entrepreneurial leadership has an impact on the extent to which firm's situation and strategic objectives integrate several general principles that may aid the firm to formulate its innovation goals and clearly define what specific role a Silicon Valley outpost would play in fulfilling those goals. (Fig .1. Executives face key issues throughout the innovation adoption).

In this study, data is measured the impact of entrepreneurial leadership on sustainable innovation adoption by using a composition of framework condition dimensions created according to Delloitte analysis index. (Table.1. Composition of Framework condition dimensions).

Table 1. Composition of framework condition dimensions (Delloitte.com, 2016)

Set innovation strategy and direction	**Explore the next S-curve**	**Establish the Innovation vehicle**	**Scout for the right partners**	**Set the modus operandi**	**Optimize investments**
• What does innovation mean for the organization? • How can leaders ensure that their companies are innovative enough?	• How can an organization build the right innovation pipeline and capitalize on trends disrupting the business?	•What innovation outposts would be most relevant? • How can firms effectively address regulatory complexity and align investments to the US regulatory environment?	• How can leaders identify the right start-ups for partnerships or acquisitions? • How can they best navigate the chaotic landscape of similar products and services, often wrapped up in slick marketing or technology lingo?	• How can organizations minimize internal resistance and accelerate time to pilot? • What are the optimal communication protocols for mutual give-and take with the "mother ship"?	• How can firms maximize returns across the investment lifecycle through incubation, launch, and scaling of new products?
•Establish innovation goals •Assign ownership of goals •Provide adequate funding and training	• Conduct a cross-industry assessment of disruptive Trends •Enable executive "immersion" in Silicon Valley	• Develop corporate venture strategy • Adopt proactive mitigation measures early in review process	• Assess potential partners' fit with the company's innovation goals	• Define the selection process for idea scouting • Establish communication protocols with the parent corporation • Define value levers	• Build business case • Develop proof of concept and conduct rapid prototyping • Develop innovation and key milestones
• Build case for change and get executive alignment	• Identify breakthrough concept to implement	• Structure transaction to mitigate regulatory risks	• Ensure profitable matchmaking	• Establish operating model for open innovation	• Enable rapid prototyping and optimal go-tomarket plan

2. Model of the sustainable innovation in Silicon Valley firms

This section describes the findings relating to data consist outputs of model of the SVI for the Silicon Valley firms. Figure 2 shows the stages required practicing an entrepreneurial leadership within a firm, and adopting a new sustainable innovation.

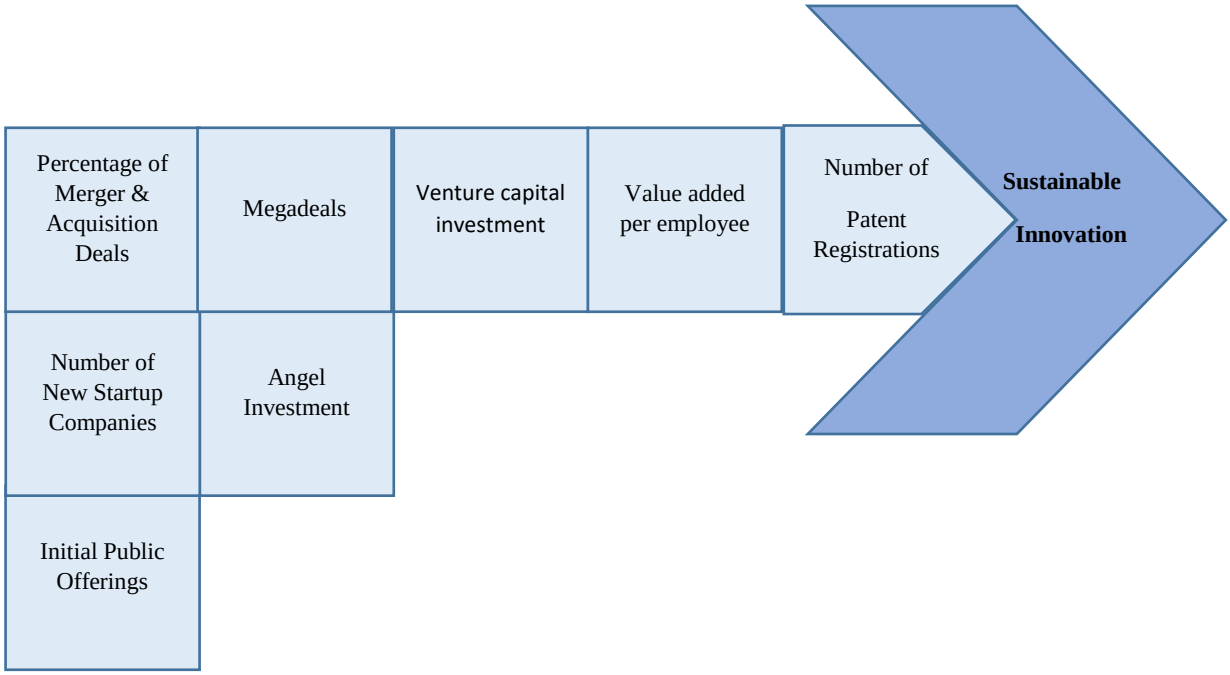

Figure.3: Practicability's to sustainable innovation adoption (Developed by researchers based on the Silicon Valley's Index enrollment data).

Based on enrolment data, we identified that Silicon Valley's annual number of patent registrations has doubled over the past 11 years (since 2009). In 2020, more than half (55%) of California patents were registered to Silicon Valley or San Francisco inventors, and San Jose ranked number one in both the state and nation.

2.1. Number of Patent Registrations, by Technology Area:

In 2020 (through December 12), there were 20,640 patents registered to Silicon Valley inventors (compared to 3,478 to San Francisco inventors); this number represents 805 fewer patents than the prior year, but nearly 2,200 more than in 2018.

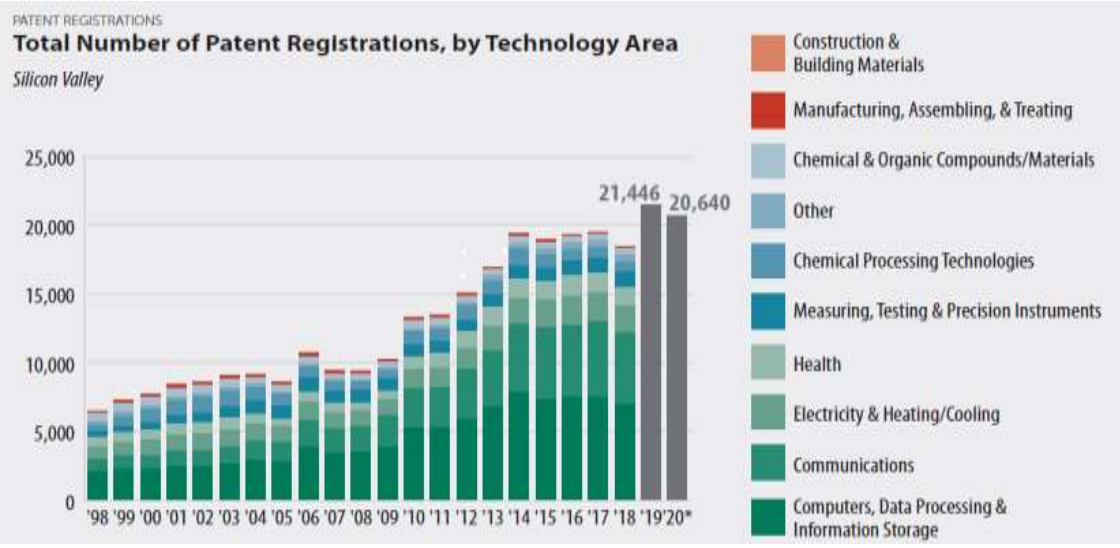

Figure.4: Number of Patent Registrations Technology Area (1)

2.2. Value added per employee:

Silicon Valley labor productivity increased in 2020, despite a decline in year-over-year regional gross domestic product(GDP) of -$19.5 billion, after inflation-adjustment. Its productivity was nearly $244,000 per employee in 2020 (equivalent to approximately $117 per hour, per employee). This compares to $237,000 in San Francisco, $190,000 in California, and $146,000 throughout the United States.

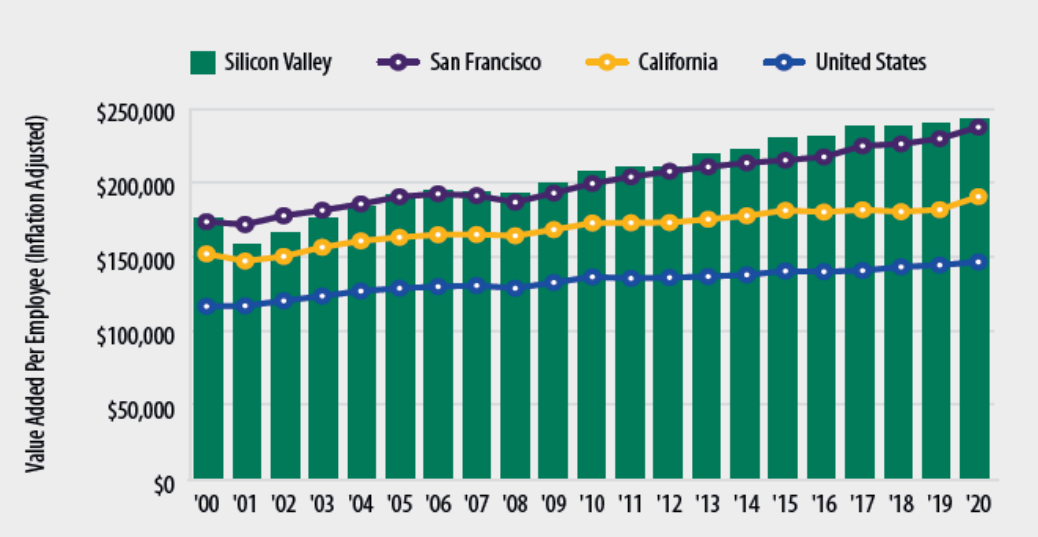

Figure.5: Value added per employee (1)

2.3. Venture capital investment:

Venture Capital investments in Silicon Valley and San Francisco companies, combined, were up 8% year-over-year in 2020, reaching a total of $46.4 billion ($26.4 and $20.0 billion, respectively). Despite this rise, the region's combined share of state and national funding declined slightly due to the sharp increase in VC deals elsewhere as well.

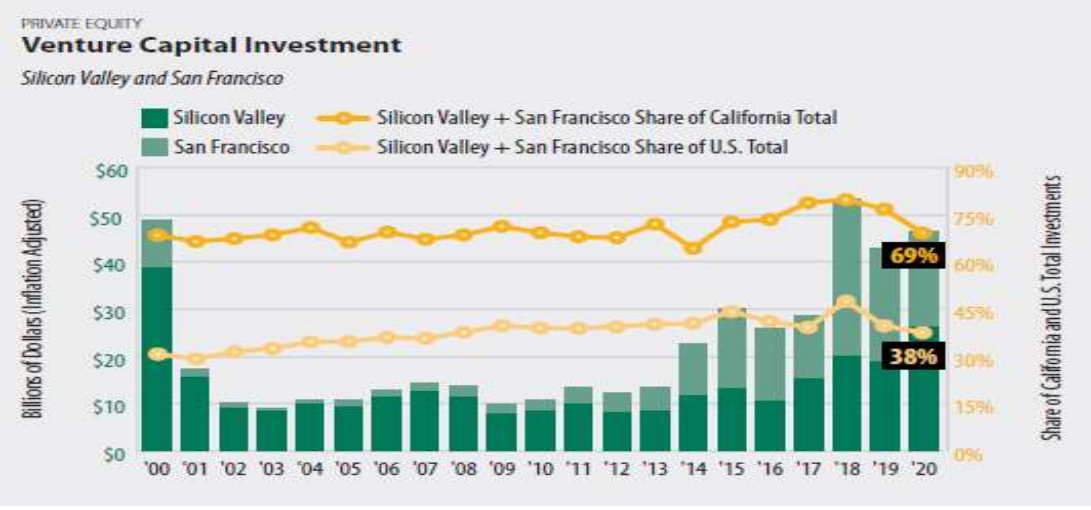

Figure.6: Venture capital investment (1)

2.4. Megadeals:

Megadeal a name given to venture capital deals over $100 million hit an all-time high in 2020 with 318 nationwide, after rising steadily each year since from 23 national megadeals in 2016. In Silicon Valley, the number of megadeals nearly doubled from 2019 to 2020.

Of the $46.4 billion in total venture capital funding to Silicon Valley and San Francisco companies in 2020, more than half of it (53%, or $24.6 billion) was in the form of megadeals.

There was a record number of Silicon Valley and San Francisco megadeals in 2020, with 108 (totaling $24.6 billion) compared to 92 ($20.5 billion) in 2019. In Silicon Valley alone, the number of megadeals grew by 81% year-over-year with 67 in 2020 compared to 37 the prior year.

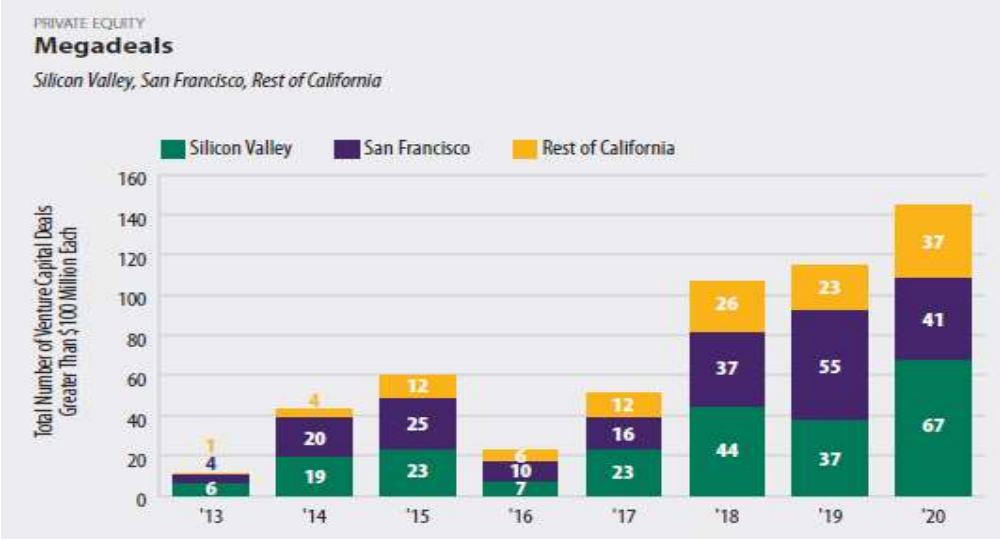

Figure.7: Megadeals (1)

2.5. Venture Capital by Industry:

Greater Silicon Valley Healthcare and Software companies continued to attract relatively steady shares of total VC funding, with 15% and 9% ($7.2 billion and $4.5 billion, respectively) in 2020.

There was a significant increase in the share of Greater Silicon Valley VC dollars to Automotive & Transportation companies in 2020—reaching more than 9% (from 4% in 2019)—largely due to the $3.5 billion total in funding to Mountain View-based autonomous car companies Waymo and Nuro.

The share of VC funding to Greater Silicon Valley electronics companies has slowly dwindled from a high of 18% in 2002 to a mere 2% in 2020; likewise, the share of VC funding to Computer Hardware & Services companies has declined from 13% to 3% over the same period.

San Francisco companies received more than double the amount of angel investment dollars in 2020 than Silicon Valley companies ($406 million, compared to $192 million).

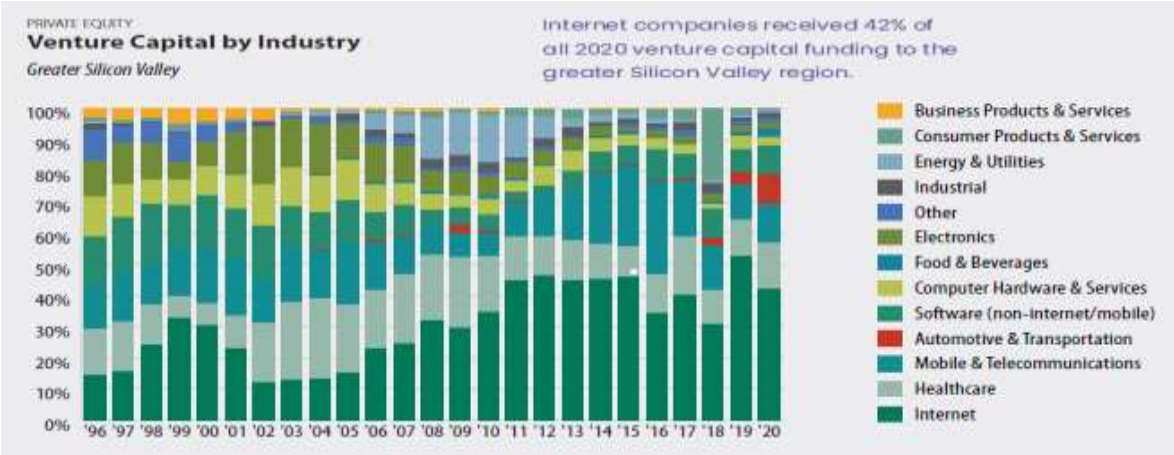

Figure.8: Venture Capital by Industry (1)

2.6. Angel Investment:

In 2020 Angel investments in Silicon Valley companies ($192 million) were $51 million more than the prior year, after inflation-adjustment; San Francisco Angel investments were up $26 million, year-over-year.

Angel investments in Silicon Valley and San Francisco increased in 2020 (by 36% and 7%, respectively, after inflation-adjustment); likewise, Angel investments throughout the state and U.S. overall were up year-over-year (by 21% and 10%, respectively).

In 2020, 68% of California (and 34% of U.S.) Angel investments went to Silicon Valley or San Francisco companies. These shares, however, have been trending downward for nearly a decade. In 2011, 84% of all California (and 47% of U.S.) Angel investments went to local companies.

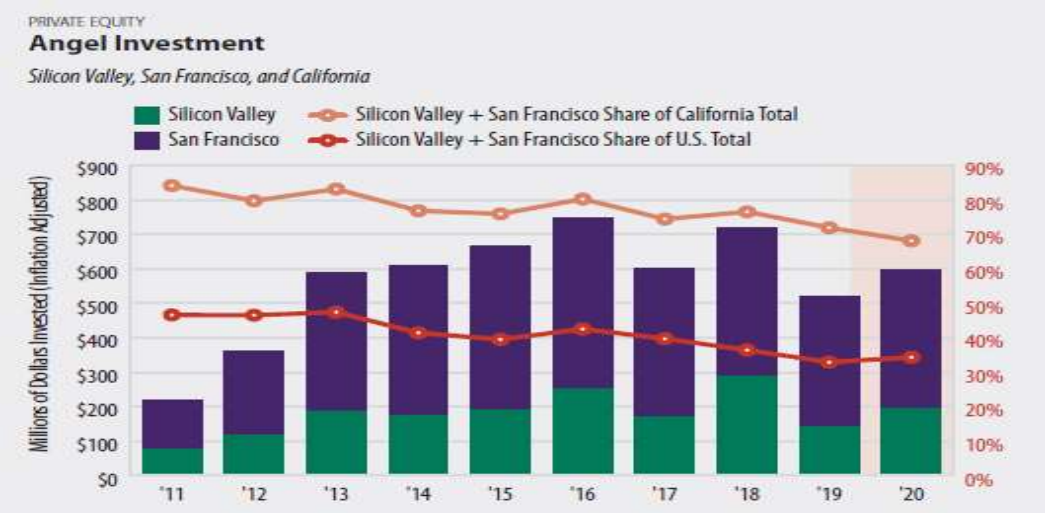

Figure.9: *Venture Capital by Industry* (1)

2.7. Number of new Startup Companies:

In 2020, 14% of Silicon Valley new startup companies were founded by at least one woman. This share that has doubled since 2007. While the share of Silicon Valley and San Francisco startup companies with at least one-woman founder has steadily increased over the past two decades, it has yet to exceed 21%.

The number of Silicon Valley startup companies declined for the sixth year in a row, with only 68 new companies headquartered in the region receiving seed or early-stage investments in 2020—a mere 10% of the number that received seed or early-stage funding in 2014.

While Silicon Valley had historically created more new startup companies than San Francisco, San Francisco has created more annually since 2010. Over the following decade, there have been a total of 11,500 new startup companies headquartered in San Francisco, and 8,700 in Silicon Valley.

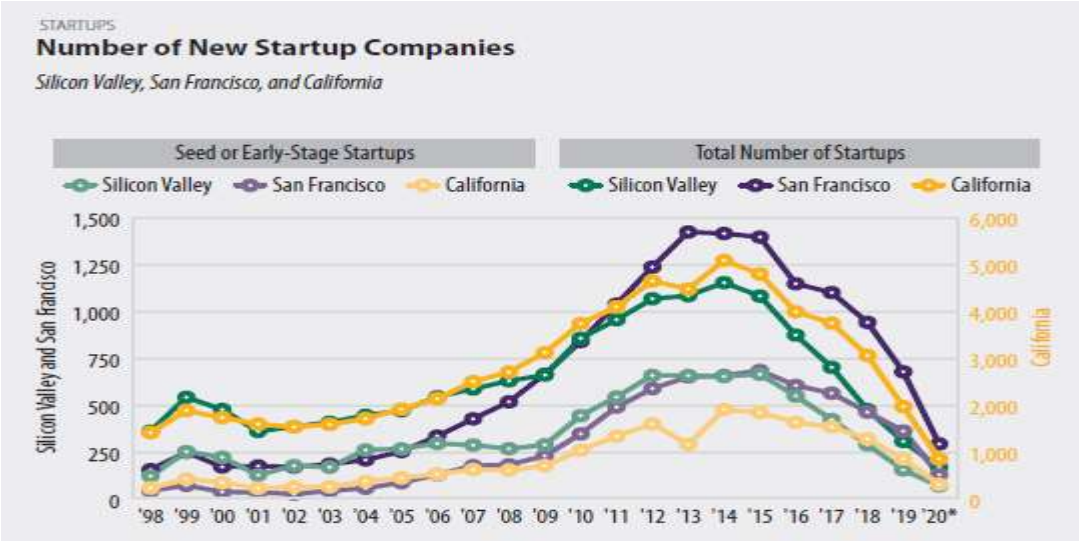

Figure.10: Number of new Startup Companies (1)

2.8. Initial Public Offerings, by Industry:

Two-thirds of Silicon Valley's 2020 IPOs (abbreviation) were in Health Care; a quarter were in Technology (the largest of which, by far, was the San Mateo-based data warehousing company Snowflake). In contrast, San Francisco IPOs were more heavily weighted toward Technology companies, with 63% in Technology (including Wish, Airbnb, Door Dash, Asana, and Unity Software) and 38% in Health Care.

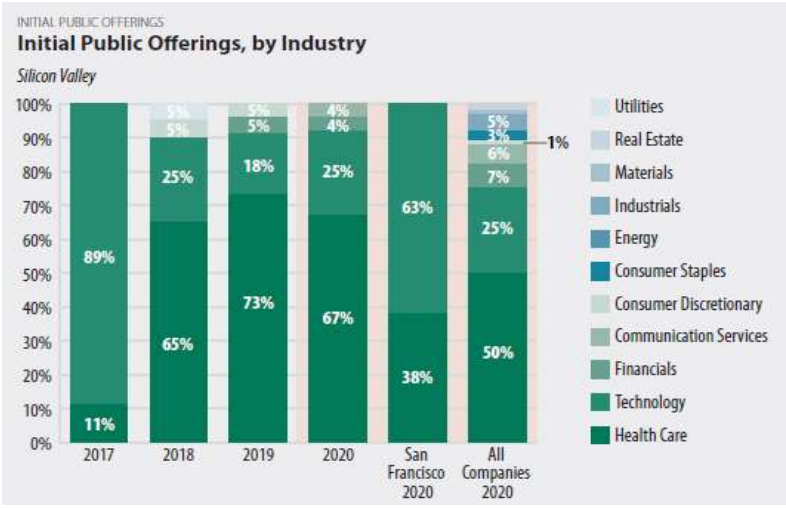

Figure.11: Number of new Startup Companies (1)

2.9. Total Number of U.S. IPO Pricings:

Silicon Valley had 24 IPOs in 2020 that raised a total of nearly $8.6 billion more than double that of the $3.9 billion raised by the prior year's 22 IPOs representing 11% of the 220 IPOs on U.S. markets as well as a proportional 11% share of the $81 billion national total (up from a 7% share the prior year). Silicon Valley had two more IPOs in 2020 than during the prior year, while San Francisco had four fewer; overall, there were 220 IPOs on U.S. markets in 2020 (a 30% year-over-year increase).

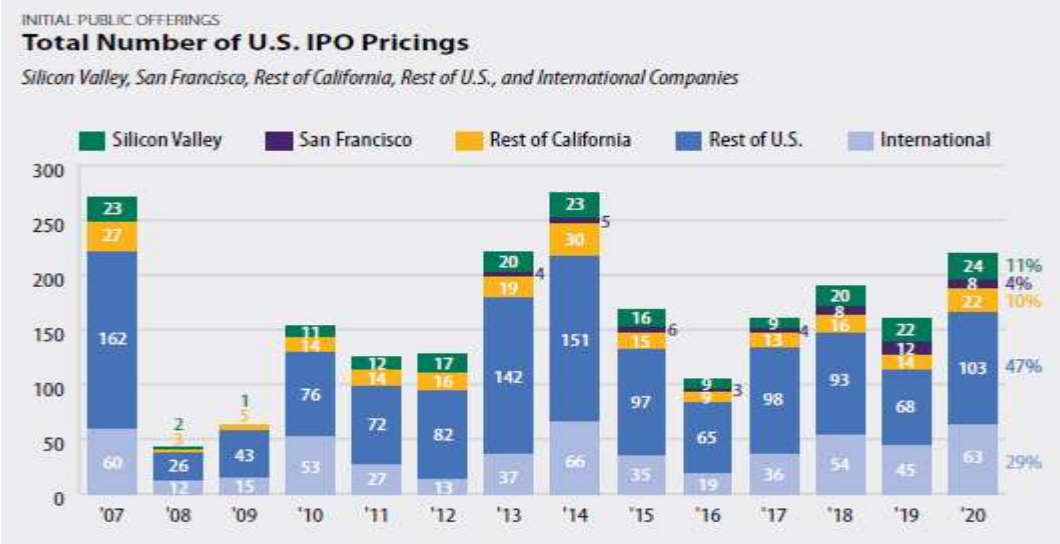

Figure.12: Total Number of U.S. IPO Pricings (1)

2.10. Number of Deals and Share of California Deals:

The largest completed M&A (abbreviation) deals of 2020 including either a Silicon Valley or San Francisco company were the $20.4 billion Gilead Sciences acquisition of New Jersey-based Immuno medics (which develops targeted cancer therapies), and the social capital acquisition of San Francisco Open Door Labs for $14.7 billion.

The total number of Silicon Valley Merger & Acquisition (M&A) deals increased in 2020, while declining slightly for San Francisco companies (556 total, compared to 607 in 2019).

64% of disclosed M&A base equity deal values in 2020 with a California company involved at least one from Silicon Valley or San Francisco ($401.4 out of $630.6 billion). The region's ten largest deals alone totaled more than $210 billion.

27% of all 2020 California M&A deals involved at least one Silicon Valley company; 23% included a San Francisco company.

Of the $401.4 billion in disclosed base equity value for M&A deals involving at least one Silicon Valley or San Francisco company in 2020, $27.1 billion included both (a Silicon Valley and San Francisco company).

2.11. Percentage of Merger & Acquisition Deals, by Participation Type:

Target M&A deals represented a slightly larger share of the total number in 2020, up from 42% to 47% for those involving a Silicon Valley company, and from 30% to 38% for San Francisco company deals. This increase was almost entirely due to Target Only deals, where local companies were acquired by non-local ones

Figure.13: Number of Deals and Share of California Deals (1)

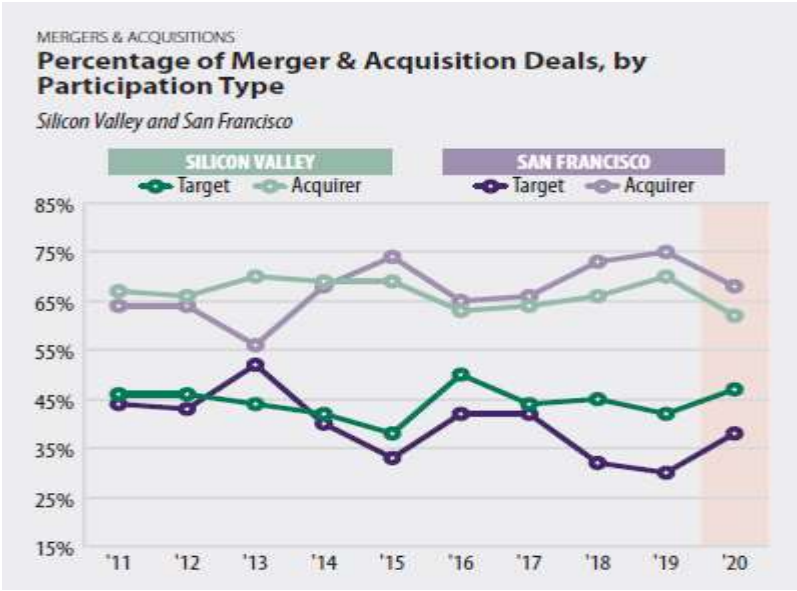

Figure.14: Number of Deals and Share of California Deals (1)

2.12. Percentage of Non-employer Firms, by Industry:

The number of non-employer firms in Silicon Valley has risen steadily over time, particularly since 2008.

In 2018, Silicon Valley had nearly 223,000 businesses without paid employees (primarily consisting of self-employed individuals operating very small, unincorporated businesses). The largest share (24%) of them were in professional, scientific, and technical Services.

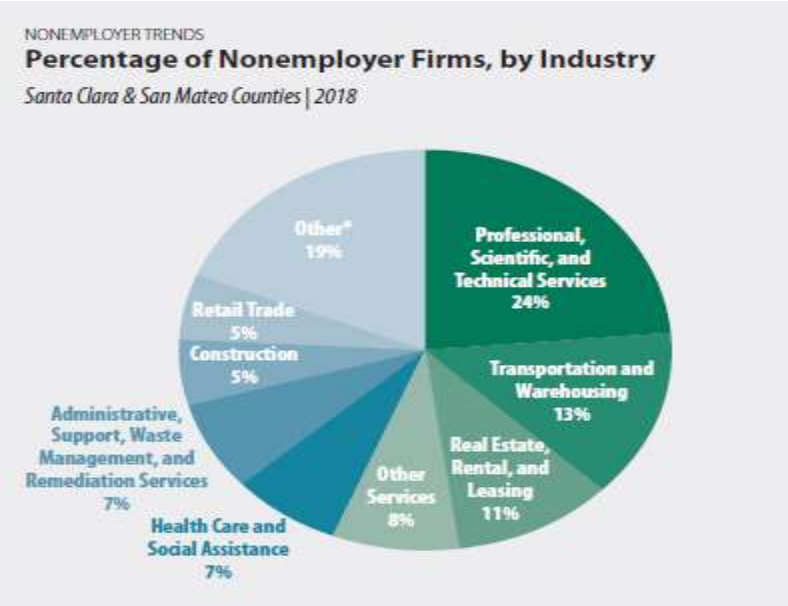

Figure.15: Number of Deals and Share of California Deals (1)

3. Discussion:

SVI 2021 uses the methods used in the previous analysis to compare and analyze entrepreneurial issues and trends. According to the resulting SVI, Silicon Valley's regional gross domestic product (GDP) fell to an estimated $351 billion in 2020—a decrease of $19 billion from the previous year. However, the decline in the level of regional employment is faster than the decline in GDP, leading to an increase in regional per capita productivity. 2020 is a record year for venture capital. The total venture capital of Silicon Valley and San Francisco companies increased by 8% year-on-year. Compared with the previous year, the number of very large "super deals" (over 100 million US dollars each) has almost doubled, and the region has 114 unicorn companies (accounting for 25% of the total number of unicorn companies in the United States, defined as private companies with a value of more than 1 billion U.S. dollars) and 8 elite decacorns valued at more than 10 billion U.S. dollars at the end of the year, with a total valuation of 370 billion U.S. dollars.

Angel investment also increased year-on-year, most of which were seed-stage transactions. At the same time, the establishment of new startups in Silicon Valley has declined for the sixth consecutive year. In 2020, only 14% of new startups have female founders. The number of patent registrations dropped slightly year-on-year, but was higher than any year before 2019 on record. Seven of the top ten patent-producing cities in the state are in Silicon Valley, and San Francisco, which ranks third, also continues the trend of rapid growth in per capita patent activity.

Initial public offerings (IPOs) were slow at the beginning of the year and then accelerated rapidly, bringing the total number of IPOs in Silicon Valley to 24 in 2020. At the end of the year, the average IPO returns for IPOs in Silicon Valley and San Francisco (+117% and +101%, respectively) were higher than the overall US IPOs (+80%). In addition, it is particularly encouraging to see how low-ranking countries have made progress in terms of favorable conditions. It is worth noting that most of the member states with a score lower than the favorable conditions for digital transformation of the EU-28 are located in Eastern and Southern Europe.

Conclusion:

The innovation is the driving force behind the Silicon Valley economy and an important source of regional competitive advantage. It transforms novel ideas into products, processes and services to create and expand business opportunities. Entrepreneurial leadership is an important part of Silicon Valley's innovation system. Leaders as entrepreneurs are creative adventurers who create new value and new markets through the commercialization of new and existing technologies, products and services. A region with a thriving innovation habitat supports a vibrant ecosystem to start and grow businesses. The entrepreneurship of new and old companies depends on the investment and value created by employees. Patent registration tracks the generation of new ideas and the ability to disseminate and commercialize these ideas.

Mergers and acquisitions (M&A) and initial public offerings (IPO) activities show that a region is nurturing successful and potentially high-value companies. Moreover, the growth of companies without employees shows that more and more people are starting to do business for themselves. Finally, tracking patent types and venture capital areas over time can provide valuable insights into the long-term development direction of the region. Changing business and investment models may point to a new economic structure that supports innovation in Silicon Valley.

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