Lifecycle of Decision-Making Factors for Investing in a Smart Vineyard. A Case Study of High-Tech Employees in the Bay Area

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Abstract

The wine industry's success is defined by the quality of produce by passionate wine growers around the world. Return on investment (ROI) is not their primary priority but maintaining their operational costs must strictly align with their overall vision. In the Bay Area, high-tech employees frequently explore promising avenues to invest their hard-earned income into something they love and that can receive high ROI. Our findings from observing and interviewing with 50 families show that they are passionate, tech-savvy, have above average net worth living in the Bay Area, who are also often social drinkers and are driven to explore investment opportunities in smart vineyards to yield high ROI while kindling their innate passion for the wine business. A primary selling point and appeal of a "smart vineyard", in other words, an entity where individuals can manage the end-to-end process including the operational costs at their fingertips on a mobile app. The smart vineyard implementation plan would be end-to-end, customized, designed and delivered with predicted risk mitigation plans. In this paper, we discuss ways to cover the gaps between viticulture high-tech investors and high-quality grapes production from a smart vineyard by discussing important decision-making factors in this entire process.

Key words: Smart Vineyard, Investors, High-Tech, ROI, Bay Area

1. INTRODUCTION

Over the past several years of high-tech industry boom in the Bay Area, there has been a huge shift in the way the high-tech employees spend their time and invest their earnings. After observing and interviewing close knit conversations with 50 families in focus groups, there has been a recurring pattern in the way these high-tech employees socialize, and it is often is over drinking a glass of wine in the evenings to talk about investment strategies to secure a happy retirement plan and protect their earnings. The Bay Area also known as the "Silicon Valley of California" has diversity of cultures, ethnic groups, and beliefs that together have brought about the advert of computer technology and information systems. Many of their employees work for top Fortune 500 companies with good take home salaries that are sufficient enough to buying home on mortgage and make investments in secondary homes while renting them out as secondary form of earnings to investing in the stock market or educational degrees as common trends to receive huge returns. This case study takes samples from these families interested in investing in viticulture knowing the high return on investment (ROI), but withdrawn by the number of risks involved ("barrier to entry") and a solution for this problem is to design a smart viticulture plan from the inception to yield high profits by keeping the risk factors in precision

check which can be achieved by making a vineyard technically smarter. Further research will be conducted through actual experimental learning experience of the solution.

2. THE PROBLEM

From sampling 50 San Francisco Bay Area families Table 1.1 describes the current investment types of these 50 families. Each is tech-savvy, with high-tech jobs and their household income is at least $150,000 per annum. The problem is the barrier of entry and concern of investing as they are not sure if the smart vineyard will yield them a good ROI and understanding decision-making factors will help them prepare better. We will conduct further research on this topic to elucidate practical application of the decision-making lifecycle proposed in this paper.

Table 1.1: Investment types of the 50 families interviewed and number of families

Investment types of these 50 families	No. of families
Stock, Bonds and Retirement Plans	38
Overseas Investment	24
Certificates of Deposit	33
Land, houses and commercial buildings	37
Educational degrees and certifications	40
Agricultural Land Overseas or in the US	12
Vineyard / Wine Business	0

2.1 Sample Data Description

50 families in the San Francisco Bay Area, California typically working for high-tech employers with an average family size of 3-4 consisting of father, mother and one-two children were observed and interviewed. Table 2.1 explains the family split, number of participants and wine consumers details. Table 2.2 explains the number of participants who showed willingness to invest in a vineyard and their principle driving motivations including significant willingness to invest due to were more than one high return on investment (ROI) as a motivation in our sample interviews conducted. A high ROI as a motivational factor was envisioned to purposely foreshadow the smart vineyard with high-tech capabilities and ease of the proposed solution that helps in decision-making to invest. Differences in motivation may contribute to the high variability in quality and quality-adjusted prices of wines in emerging wine regions. [Li, J., Gómez, M.I., Brent Ross, R. and Chaddad, F.R. (2019)] Recognizing differences in owner motivation is critical to establish appropriate policies to support the development of the wine industry in emerging regions. [Li, J., Gómez, M.I., Brent Ross, R. and Chaddad, F.R. (2019)] In this paper, we will focus on high ROI to purposely maximize profits and derive a possible by a smart vineyard as a solution to help in closing the open questions and concerns that were raised by these high-tech employees who are willing to invest, thereby reducing barriers to entry of these consumers.

Table 2.1: Family split size, number of participants and number of wine consumers among the 50 families observed and interviewed in person

Family split	No. of Participants	Working in High-Tech	No. of Wine Consumers
Father	50	50	39
Mother	50	36	27
Children (21 + years)	16	12	9
Total	**116**	**98**	**75**

Table 2.2: Motivational factors to invest in a smart vineyard and number of willingness to invest in a smart vineyard.

Motivational factors to invest in a smart vineyard	No. of participants who showed willingness to invest in a "smart" vineyard
Passion	26
High Returns on Investment (ROI)	60
Sense of ownership	12
Recreational Investment	4

3. THE SOLUTION

3.1 *Smart Vineyard Management System (SVMS)*

Greater awareness is needed in the adoption of innovations, as they require significant investments in capital and human resources so that they may bring an increase in competitiveness. [Sarri, Lombardo, S, Pagliai, Perna, Lisci, De Pascale, V, Rimediotti, Cencini, G. and Vieri, M , 2020] The increasing availability of agricultural technologies able to provide data requires an exact integration process. Tools including the Business Model Canvas [4], the assessment of the Technological Readiness Level (TRL) level and the restructuring of processes according to lean and, most recently, lean plus green methods, offer advantages that allow farms to acquire highly competitive margins. [Sarri, Lombardo, S, Pagliai, Perna, Lisci, De Pascale, V, Rimediotti, Cencini, G. and Vieri, M , 2020] This methodology proposed for smart farming was divided in four stages (1. understanding the changes in action; 2. identifying the added value of Smart Farming processes; 3. verifying the reliability of new technologies; 4. adjusting production processes) that can be applied at different levels in vine farms to make the adoption of precision agriculture techniques and technologies harmonious and profitable. [Sarri, Lombardo, S, Pagliai, Perna, Lisci, De Pascale, V, Rimediotti, Cencini, G. and Vieri, M , 2020] The proposal for smart farming methods have not been implemented yet for profitability evaluation but concludes the results of the "Oenosmart" project [Sarri, Lombardo, S, Pagliai, Perna, Lisci, De Pascale, V, Rimediotti, Cencini, G. and Vieri, M , 2020]. Once the Oenosmart project goes live, it can open doors to prove the decision-making factors lifecycle proposed in this paper.

3.2 Process of Investing, Tracking Operations and Profits/Losses

First and foremost, smart farming applications to viticulture needs to be adopted by smart vineyard supporting startups or companies who can facilitate the investment as process as investors or provide the appropriate financial referrals to these investors. This process can be carried out by a single company or multiple contracting companies looping together in a business chain, while still maintaining the whole product concept [Sallez, Y., Berger, T., Deneux, D. and Trentesaux, D., 2010]. Finally, a monitoring service like a web/mobile dashboard should be included to track operations at the smart vineyard, evaluating risks, tabulation of the operational and capital expenses incurred and declaration and summation of net balance sheet. This will provide succinct and easily accessible information for Bay Area high-tech investors so they may focus on their day job while easily monitoring their smart vineyard, stress free. Journalist Samuel Squire spoke with growers from several winegrowing regions about the vineyard management apps they've adopted and how these have proven to be highly beneficial. [The North Bay Business Journal. (2018)]

3.3 Evaluating and Mitigating Risk Factors

There are many risk factors involved in managing a vineyard needing to be disclosed to the investor responsibly from their conception. a. Damage or destruction of buildings and inventory due to perils such as earthquake or fire b. Wine leakage c. Wine stock contamination d. Business interruption e. Liability [Johnson, L.F., Pierce, L., DeMartino, J., Youkhana, S., Nemani, R. and Bosch, D., 2003]

Mitigation plans that are thoroughly tested and verified over the years of viticulture must be included in the whole process from the smart vineyard's original to obtain buy-in of investors for each historical risk foreseen. Image-based tools like remote sensing, multi-spectral image processing, leaf area, irrigation modeling, yield monitor, viticulture, decision making Vineyard managers in California's premium wine industry are concerned with canopy development, field uniformity, relative amounts of leaf and fruit production, and irrigation management strategy. [Li, J., Gómez, M.I., Brent Ross, R. and Chaddad, F.R. (2019).] It is concluded that remote sensing can provide a basis for decision support in vineyard management. [Li, J., Gómez, M.I., Brent Ross, R. and Chaddad, F.R. (2019).] Including these tools can bring an open communication to the smart vineyard investors in short- and long-term decision-making process for investors.

4. **POSSIBLE DECISION-MAKING FACTORS FOR BAY AREA HIGH-TECH INVESTORS**

In summary, a successful investment model for the Bay Area employees is built of facilitation of a clear end-to-end whole product model and optimization of the model through improvising "smartness" in vineyard business management. The smartness here is defined by the continuous improvement (CI) that is incremental. An increasingly popular strategy for enabling continuous improvement is through mobilization of high level of involvement of the workforce in sustained incremental problem-solving. [citeseerx.ist.psu.edu. (n.d.).] To adopt an evolutionary CI model, the smart vineyard has to adopt and make some behavioral changes. Building behavioral capability of this kind constitutes an important contribution to the resource base of the firm and one which it can deploy in pursuit of a variety of strategic goals — lower costs, improved

quality, faster response, etc. However, the process of accumulating such a resource is a long and difficult one involving articulation and learning of behaviors and practicing and reinforcing them until they become routines — 'the way we do things around here'. [Sallez, Y., Berger, T., Deneux, D. and Trentesaux, D., 2010] Figure 1 consolidates the problem in section 2, the solution in section 3, intertwined with the proposed lifecycle decision-making factors to invest in a smart vineyard.
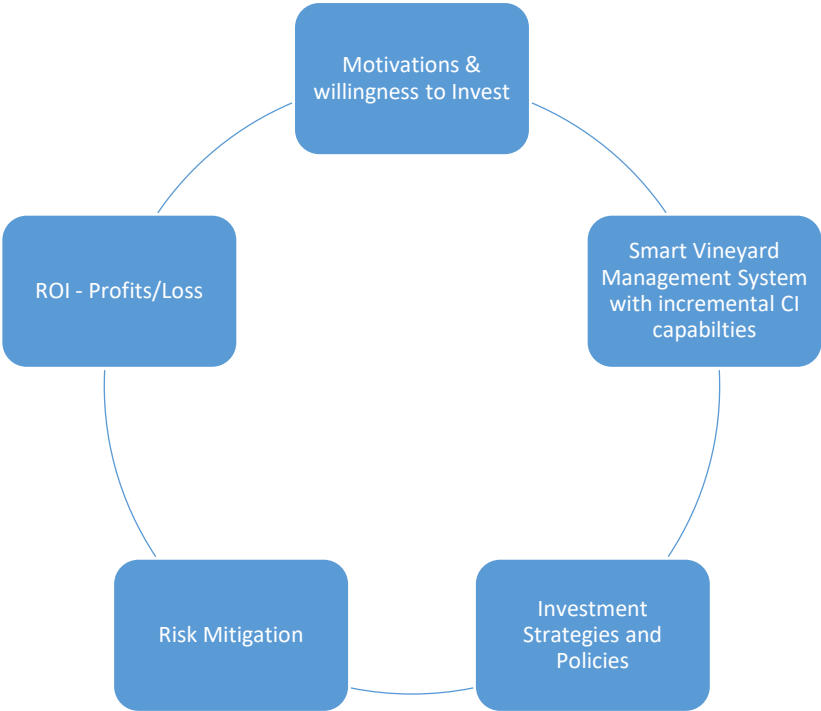

Figure 1: Lifecycle of decision-making factors for investing in a smart vineyard

5. CONCLUSION

The San Francisco Bay Area high-tech employees would like to be informed about the know-how in viticulture, investment strategies and regional policies, minimize risks and maximize profits. The "smartness" of the vineyard is the motivational factor for high ROI. By adopting the decision-making lifecycle, startups can build the smart vineyard management system (SVMS) with CI capabilities or existing wine businesses can adopt a change management cycle to introduce a SVMS, financial lending companies can prepare for short term and long term investment plans, high-tech workers can better invest by keeping the entire system in check, risks can be minimized with the prediction of threats and new entrants into the market without compromising on the quality or yield and finally reap benefits. The decision-making factors proposed in this paper serves as a strong basis to help these types of investors to take the next steps to invest. Further research will take these factors to test and evaluate the adoption by investors by implementing the smart vineyard.

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