Entrepreneurial Success for High-tech Start-ups - Case Study of Taiwan High-Tech Companies

Ya-Wen Yu
Department of Business Administration
Asia University
500, Liufeng Rd., Wufeng, Taichung, Taiwan 41354
ywyu@asia edu.tw
yoyawin@gmail.com

Yu-Shing Chang
Department of Global Marketing and Logistics,
Ming-Dao University, 369 Wen-Hua Road, Pee-Tow, Chang-Hua, Taiwan
through@mdu.edu.tw

Yu-Fu, Chen
Institute of Management of Technology
National Chiao-Tung University
1001 University Road, Hsin-Chu 30010, Taiwan
sbibby.mt93g@nctu.edu.tw

Li-Sheng Chu
Department of Business Administration
Asia University
500, Liufeng Rd., Wufeng, Taichung, Taiwan 41354
chulisan@gmail.com

***Abstract* - Continuous innovation, research and development in technology, manufacturing and production provide the basis for continuous growth and profit. This paper examines how start-up enterprises achieve their operational success. Literature review and the case study method were applied to support the factors of sixteen enterprises within the Hsin-Chu Science Park. This research explore their entrepreneurial motives and opportunities, and factors on how to achieve entrepreneurial success in high-tech start-ups. The results showed the successful business model for start-up enterprises lies in scale economy, cost controlling, and after-sale service. The most concerned risks are in whether the customer relationship is steady and its avoidance of bad debts; while having enterprises also found more success when led by market opportunities rather than by new technologies. It is often agreed that innovation is the key for an enhanced economic performance. Thus, this paper aims at finding strategies entrepreneurial motives and opportunities, and factors on how to achieve entrepreneurial success for high-tech start-ups.**

Keywords: Entrepreneurship; Motivation; Start-ups; Hsin-Chu Science Park; Strategies

I. INTRODUCTION

As a nation achieves a higher level of Gross Domestic Product (GDP), the main source of change is innovation. Porter and Stern (2001) described competitiveness and innovation in advanced countries changes as the challenges for creating and commercializing new products and processes shifting the technological frontier as fast as their rivals could perform. In addition, the statistical comparison on economic performance among nations shows that the intensity of national innovative activity is correlated with a higher standard of living and productivity growth (Furman et al., 2002). Based on Israel's Central Bureau of Statistics Report (2001), the high-tech industry contributes to 75% of the overall growth in Israeli's Gross National Product (GNP). However, the rate of growth in the high-tech industry was 12%, and the conventional industry growth rate was 2%. According to the global competitiveness report published by the World Economic Forum in 2007-2008, Taiwan's Growth Competitiveness Index (GCI) ranked the fourteenth in the world due to the success of its high-tech industries (i.e. the innovation factors ranked tenth in the world) (Department of Investment Services Economic Department Talent Network, 2007). Unlike the conglomerate enterprises in Korea that were well supported by the Korean government, the small and medium enterprises in Taiwan (SMEs), especially those in the science parks, played an important role in Taiwan's economic growth. Most of the technology start-ups in Hsin-Chu Science Park provide products or services for Integrated Circuit (IC) and Thin-Film Transistor Liquid-Crystal Display (TFT-LCD) manufacturing enterprises. Leading enterprises in this industry have significant capital investments in its set up of manufacturing facilities and research and development for enhanced manufacturing efficiency and innovation. Therefore, the high-tech industry of Taiwan plays a major role in the global supply chain on manufacturing for consumer electronic and information products.

Taiwan's science and technology has ranked in the world's top three. This has benefited Taiwan's leading electronics and information technology of industries. Based on the Small and Medium Enterprise Administration of Taiwan's report (SMEA, 2007), Taiwan's SMEs accounted for 97.7% of total corporations. It is no wonder Taiwan has the reputation of "Boss Island" (Shieh, 1992). However, approximately 10% of the SMEs in Taiwan do not survive over 12 months and a further 40% dissolved within five years (SMEA, 2005). In addition, the profit earning ability and innovation competitiveness of Taiwanese high-tech

978-0-7695-4684-1/12 $26.00 © 2012 IEEE
DOI 10.1109/IMIS.2012.148

industry has been diminished by the downturn in GCI ranking from the fifth to the fourteenth from 2003-2004 to 2007-2008. This indicates there are many managing issues that can be discussed in relation to a high-tech innovational and entrepreneurial environment.

As a result of a restructuring in the industrial industry, the rise of a knowledge-based economy, and low cost labor, enterprises from Mainland China have gained significant shares of market and business opportunities from enterprises in Taiwan. This impact leads to (1) challenges for entrepreneurs to face the changes of proportion on the global market; (2) rapid changes in customer preferences; (3) higher risk on excess inventory; (4) excessive global supply, in which the seller with increased operational risk. Thus, in this study, we focused on sixteen start-ups enterprises in the Hsin-Chu Science Park, to learn methods used of those enterprises of how they overcome the encountered risks and factors that lead to its operational success in order to serve as a reference for future entrepreneurs.

II. LITERATURE REVIEWS

A. The Operation Risk Stages in the Organization

Kazanjian (1988) discussed stages of management problems that might occur in the high-tech industry. The first stage consists of R&D and start-ups, management problems for this stage are resources/capital acquisition, market development, technology development, product design and other issues; stage two consists of the competition period and expansion of production capacity, problems in this stage includes production problems and appropriate market positioning; stage three is market growth, which is facing market share and growth in large-scale organizational structures and distribution issues; stage four is the stable period methods to obtain product expansion, a stable market share, develop of new market, increase profit, strengthen of internal controls, as well as laying of the foundation for future growth are important issues in this stage.

Bae (2000) studied new businesses created in Silicon Valley and found ten challenges those enterprises are facing are in strategy, technology, marketing, finance, management, human resources, law, culture, globalization, and communication. The enterprises are faced with obstacles that would result in different stages of development and cultural background; to change, especially when the business is in two stages of the transition period, the barriers will become even more intense. Suzuki et al. (2002) compared Silicon Valley start-ups with Japanese enterprises start-ups and found that Silicon Valley entrepreneurs put greater emphasis on market and financial risk; and Japanese entrepreneurs think that the main risk for start-ups are human resource or organizations, technology, and globalization sources.

Shepherd (2000) compiled other scholars' research and listed risk of failure of new start-ups businesses including the cost for learning new tasks (Stinchcombe, 1965; Singh et al., 1986); new product features (Aldrich and Auster, 1986); new organization, the intensity of role conflict (Stinchcombe, 1965; Singh et al. 1986); the existence of informal organization; (Stinchcombe, 1965); and stability and relationship of important connection and people that business is associated with (Stinchcombe, 1965; Singh et, al. 1986); as well as the stability of the organization (Hannan and Freeman, 1984). And Shepherd (2000) also proposed a new micro-perspective of start-up enterprises from the risk of failure, with various causes, namely in three areas, "the lack of market experience", "lack of production experience," and "lack of management experience", so the acquisition and dissemination of information can help to improve the speed of start-ups enterprises (Parkhe, 1991). Lee (2011) studied the entrepreneurial intentions on influence of organizational and individual factors, to find why individuals intend to leave their jobs to start business ventures.

According to the above, Taiwan's high-tech industry not only stimulates domestic economic growth but also strongly influences the global economy, and very few studies have discussed the risk of management for high-tech businesses, thus, in view of Taiwan's R&D and commercialization capabilities, we used Kazanjian's study (1988) section one phase and second phase as the basis of this study to find out cause of Taiwan's new start-up companies' risk.

B. Key Success Factors in New Venture Business

In this section, we explore related studies and literature review from domestic and foreign experts and scholars on business management and entrepreneurial success in defining the identification methods of critical success factors, and empirical studies on entrepreneurial success factors.

Drucker (1985) stated there are four management needs for a new business venture: (1) the need to focus on the market; (2) the need to build a forward-looking financial plan, for example, cash flow and future capital requirement planning in particular; (3) the need for early establishment of the management team; (4) the need to understand the role of new business start-ups entrepreneurs, scope of work and relationships. Betz (1998) stated high-tech start-ups need to have 10 kinds of important capabilities, including: (1) access to venture capital funds; (2) development of new products, new services, or a prototype; (3) building product capacity; (4) a way to increase sales; (5) a way to increase profits; (6) ability to expand production capacity; (7) ability to overcome the challenges of competitors; (8) improvement of product quality and diversification; (9) the establishment of organization and management systems; (10) management of current assets. Block and Macmillan (1985) said the success of new businesses created will be based on milestones in planning with 10 listed as follows: (1) generate ideas to complete product testing; (2) completion of a prototype; (3) the initial financing; (4) the completion

of the initial plant test; (5) market testing; (6) the first batch of production; (7) a leading marketing strategy; (8) the first time to compete operations; (9) consistently re-design or make amendments; (10) substantially lower prices.

However, a successful business venture from an entrepreneur's point of view means a company's product or service can obtain profitability. Thus, in order to achieve this success, the meaning of business management, as analyzed in relevant literature research, the implication of venture management is defined as follows: entrepreneurial management as the entrepreneurial pursuit of entrepreneurial purpose, since the company was founded only after the success to the business, during which included: (1) access to venture capital funds; (2) new products or new services; (3) the establishment and expansion of production capacity; (4) business model; (5) competitive strategy formulation; (6) organization and management systems established; (7) the work of seven publicly traded management behavior.

Enterprises key success factor is not static; it changes over time, due to market demand and environment change. Enterprise key success factor changes and needs are different at various stages (Rockart, 1979; Bruno and Leidecker, 1984; Ohmae, 1991; Seetoo, 1995; Terjesen and Elam, 2009; Fletcher, 2010; Lin et al., 2006; Hampton et al., 2011; Chen and Yu, 2008). We also used analysis based on Porter's Value Chain Model (1985), to evaluate values of different business activities; this will enhance the high-tech start-ups to operate with more compatibly.

Few studies have studied about new venture business and critical success factors for new venture business (Dushnitsky, 2010; Shane, 2009; Gadenne, 2009; Grilli, 2011), in this study we collected and analyzed related literature studies, explored various stages of operational risk that enterprises are currently facing or likely to encounter, as well as investigated how these start-ups survived the economy downturn. This would allow us to understand the key survival factors for start-ups, which would also enable us to determine the key factors for success.

III. RESEARCH METHOD

A. Case Study Method

This study focus on the newly established science and technology enterprises in Hsin-Chu Science Park, we want to explore how these new enterprises achieve operational success, and compare key success factors (KSF) from the literature. Based on Yin's (1994) case study in which he points out that the case study method consists of single case studies and multiple case studies, the analysis type also contains a single analysis and multiple analyses, so you can design the composition into four types: 1. Single case (holistic) design; 2. Single case (embedded in nature) design; 3. Multi-case (holistic) design; 4. Multi-case (embedded in nature) design, this study is a type 2, the reason to choose case study method is because case study method findings are based on the case studied. The focus of this research is to use the literature review method to gather relevant venture model, and analyze business risk, in order to get specific findings. The research question is based on how to venture into a new business, and how to achieve the business performance goals.

B. Sample Collection & Sample Selection

In this study, we first gathered relevant information from the case company, which includes relevant information from interviews, filed records, news reports, and observation.

Sixteen enterprises are represented from A to P Company. To categorize the enterprises, five case enterprises are agents or distributors, and the rest of the 11 enterprises are from engineering, systems, and manufacturing enterprises. Our selected enterprises in this study all meet the stringent requirements of science park regulations and rules, with high standard dust-free rooms, wastewater treatment, water treatment, air-conditioning system, and electro-mechanical systems high specifications. Most of the respondent in this study are senior managers of the company; this will help us to understand more clearly of company's business history, technology sources, operational risk, and be utilized to explore the relevant research base.

In addition, these sixteen enterprises' revenue/capital ratio is above average, which should be qualified as successful start-ups enterprises for this study.

IV. DISCUSSIONS

In this study, sixteen enterprises were chosen based on the business opportunity, venture motive, source of funding, industry life cycle; survival key and operational risk. This gives us a better understanding of Taiwan's current science and technology trend for newly ventured enterprises.

From the research study of 200 entrepreneurs, Liu (2001) found that the major source of entrepreneurial ideas came from: (1) improvement on existing products and services; (2) following new trends; (3) fatal business opportunities; (4) through systematic study. Benjamin and Philip (1986) studied factors affecting motivation for entrepreneurship, which are divided into "push" and "pull" factors. They found certain negative factors can stimulate people's entrepreneurial potential (push theory), such as job satisfaction, unemployment, career setbacks, etc.; while some positive factors may attract entrepreneurial activities, such as potential profit opportunities, right to give orders, and being respected. The "Push Theory" recognizes that entrepreneurs are not satisfied with their status which is also called negative emotional factors, so it is more appropriate to call it "negative push" theory. The pull theory says that the external wellbeing and new profit opportunities arise with positive influence factors. In this study, we expanded the "Push Theory" as the "Intrinsic factors", and "Pull Theory" as "Extrinsic factors".

Case companies' entrepreneurial start-ups motivation is shown in Table 1, in this table we can see that the original source for start-ups of these technology entrepreneurs is

mainly based on their previous working experiences; they start their own company because they believe there is evidence to show opportunities have arisen. Based on the above findings of the sixteen enterprises, we can summarize that most enterprises start their business because of external opportunities (87.5%) (Table 2).

Table 1 Entrepreneurial start-up motivations

Entrepreneurial method	Company code
Discover new market opportunities	E, K
Find a new business opportunity from former working experience	A, F, G, H, L, J, O, P
Spin-off from company	N
Self-exploration	M
Encouragement from complementary partners	C, I
Intrinsic rewards	B

Table 2 Ratio from intrinsic and extrinsic factors

Criteria	Company	Ratio
Intrinsic factors	B, M	12.5%
Extrinsic factors	A, C, E, F, G, H, I, J, K, L, N, O, P	87.5%

To find success factors of high-tech start-ups, this study will base on the following index: Venture capital sources, technology sources, operational risk, and analysis on operational effectiveness.

A. Venture Capital Sources

Most of the venture capital sources came from the entrepreneur's previous saving and external funding from friends and family. The benefits of using the founder's capital are that business plan is not required and if there is enough capital to support R&D then the investors will not interfere with product development. Thus Bell and McNamara (1991) concluded that the self-owned fund is more efficient and time effective. However, other scholars think if the entrepreneurs are totally dependant on their funding, they might lose the opportunity to seek more professional consultation from investment institutions that can offer consulting and other value-added services.

Stancill (1986) indicated that most entrepreneurs might underestimate the capital needed for a start-ups business. How much money is enough for a business to start is always a concern for start-ups. Moreover, it is difficult to estimate how much money is needed over the next five years, but Stancill (1986) mentioned that thoughtful and clear financial statements could solve this problem to estimate the actual situation. This shows in the start-ups' process, the greatest risk of business operations is the lack of working capital.

B. Technology Sources

Most of the technical sources of these enterprises came from former work related experience, and then they start a new business after opportunities arise.

C. Operational Risk

Especially during the economic downturn, start-ups or SMEs might need to face more problems because of the lack of resources and capital. In addition, start-ups or SMEs often have less connection with clients and businesses; therefore there is also a bigger chance on bad debit from unstable clients. Another problem may occur, which is the change in international specifications, which may result in a huge loss for start-ups or SMEs.

D. Analysis on Operational Effectiveness

As the case enterprises are unlisted enterprises, the majority declined to disclose their net profit, therefore, we can not use earnings per share (Earning Per Share, EPS) as the performance measure, so we use the revenue/capital of operating performance as measurement indicators, to illustrate each case company's capital and how much created revenue they have.

V. CONCLUSIONS

We choose Hsin-Chu Science Park enterprises as our sample for this study due to the high success entrepreneurial rate; this study hopes to learn from its key success factors.

ACKNOLOWEDGEMENT

The authors would like to thank the National Science Council of the Republic of China for financially supporting this research under Contract No. NSC 100-2410-H-468-005.

REFERENCES

[1] Chen, C. (2004), Auction Shopping Decision Factors: Based on the product type, bid times, and information source. Unpublished Master's Theses, Department of Advertising, National Cheng-Chi University.

[2] Euser (2005), A Research on Internet Money Making Business. Taipei, Netz Publishing.

[3] Euser (2006a), 50 Things Must Do for Making Money from Online Auction. Taipei. Netz Publishing.

[4] Euser (2006b), Business Venture for Clothing King: A Real Case Study. Taipei, Netz Publishing.

[5] See-Too, D. Strategic Management. 2nd edition. Taipei, Yuan-Liou Publishing.

[6] Porter, M. E. (1985), Competitive Advantage. New York, Free Press.

[7] Tu, S-Z. (1992), A study of promotional preference with the female-clothing consumers. Unpublished Master's Theses, Gratuate Institute of Management Science, TamKang University.

[8] Wu, S. (2009), Value-Chain Analysis: Anatomy of operations, diagnostic business advantag. Management Today. Available at: http://www.managertoday.com.tw/?mod=locality&func=view&id=1751

[9] Yuan, L. (2004), SZNews Business Report, Available at: http://www.sznews.com/szsb/20040531/ca960122.htm

[10] Aldrich, H.E., and Auster, E.R. (1986), "Evan Dwarfs Started Small: Liabilities of Age and Size and Their Strategic Implications". Research in Organizational Behavior, Vol. 8, pp. 165-198.

[11] Bae, Z.T. (2000), Overcoming the Barriers in Creating and Managing High-tech Ventures: A Case Study of Korean Start-ups in Silicon Valley, A/PARC Seminar, Stanford University, U.S.A.

[12] Bell, C.G. and McNamara, J.E. (1991), High-tech Ventures - The Guide for Entrepreneurial Success. N.Y.: Addison-Wesley.

[13] Benjamin, G., and Philip, L. (1986), "A Behavioral Model of Entrepreneurial Supply", Journal of Small Business Management, Vol. 24, pp. 45-53.

[14] Betz, F. (1998), Managing Technological Innovation: Competitive Advantage from Change. NY: Wiley-Interscience.

[15] Block, Z., and MacMillan, I.C. (1985), "Milestones for Successful Venture Planning", Harvard Business Review, Vol. 63, No. 5, pp. 184-189.

[16] Bruno, A.V., and Leidecker, J.K. (1984), "Identifying and Using Critical Success Factors", Long Range Planning, Vol. 17, No. 1, pp. 23-32.

[17] Chen, H-C. and Yu, Y-W. (2008), "Using a strategic approach to analysis the location selection for high-tech firms in Taiwan," Journal of Management Research News, Vol. 31, No. 3, pp. 228-244.

[18] Drucker, P.F. (1985), Innovation and Entrepreneurship: Practice and Principles, NY: Harper and Row.

[19] Dushnitsky, G. (2010), "Entrepreneurial Optimism in the Market for Technological Inventions", Organization Science, Vol. 21, pp.150-167.

[20] Fletcher, D. (2010), "Life-making or risk taking'? Co-preneurship and Family Business Start-ups", International Small Business Journal, Vol. 28, pp. 452-469.

[21] Furman, W. (2002), "The Emerging Field of Adolescent Romantic Relationships", Current Directions in Psychological Science, Vol. 11, No. 5, pp. 177-180.

[22] Gadenne, D. (2009), "Critical Success Factors for Small Business; An Inter-industry Comparison", International Small Business Journal, Vol. 17, No. 1, pp. 36-56.

[23] Grilli, G. (2011), "When the going gets tough, do the tough get going? The pre-entry work experience of founders and high-tech start-up survival during an industry crisis", International Small Business Journal, Vol. 29, No. 6, pp. 626-647.

[24] Hannan, M.T., and Freeman, J. (1984), "Structural Inertia and Organizational Change", American Sociological Review, Vol. 49, pp. 149-164.

[25] Hampton, A., McGowan, P. and Cooper, S. (2011), "Developing Quality in Female High-Technology Entrepreneurs' Networks", International Journal of Entrepreneurial Behaviour and Research, Vol. 17, No. 6, pp. 588-606.

[26] Kazanjian, R.K. (1988), "Relation of Dominant Problems to Stages of Growth in Technology-Based New Ventures", Academy of Management Journal, Vol. 31, No. 2, pp. 257-279.

[27] Khaire, M (2010), "Young and No Money? Never Mind: The Material Impact of Social Resources on New Venture Growth", Organization Science, Vol. 21, pp. 168-185.

[28] Lin, B.W., Li, P.C., and Chen, J.S. (2006), "Social Capital, Capabilities, and Entrepreneurial Strategies: A Study of Taiwanese High-Tech New Ventures", Technology Forecasting and Social Change, Vol. 73, No. 2, pp. 168-181.

[29] Lee, L., Wong, P.K., Foo, M.D., and Leung, A. (2011), "Enterpreneurial Intentions: The Influence of Organizational and Individual Factors", Journal of Business Venturing, Vol. 26, pp. 124-136.

[30] Liu, C.Y. (2001) Knowleage Base for Management Learning. http://140.127.178.70/know/, accessed 15 July 2010.

[31] Ministry of Economic Affairs and Statistics Department (2004) Manufacturing of Domestic Investment: The Fact-finding Report. Taipei: Ministry of Economic Affairs (Taiwan).

[32] Ministry of Economic Affairs for Small and Medium Entserprise (2005) White Paper on SMEs. Taipei: Ministry of Economic Affairs (Taiwan).

[33] Ohmae, K. (1991), The Borderless World, New York: Harper Collins.

[34] Parkhe, A. (1991), Interfirm Diversity, Organizational Learning, Longevity in Global Alliances. Journal of International Business Studies, Vol. 22, pp. 579-601.

[35] Porter, M.E. (1985), Competitive Advantage: Creating and Sustaining Superior Performance, New York: Free Press.

[36] Porter, M.E., and Stern, S. (2001) Innovation: Location Matters. MIT Sloan Management Review, Vol. 42, No. 4, pp. 28-36.

[37] Rockart, J.F. (1979), "Chief Executives Define Their Own Data Needs", Harvard Business Review, Vol. 57, No. 2, pp. 81-93.

[38] Seetoo, D.S. (1995), Strategic Management. Taipei: Yuan-Liou Publishing.

[39] Shane, S. (2000). Prior Knowledge and the Discovery of Entrepreneurship Opportunities. Organization Science, Vol. 11, No. 4, pp. 448-469.

[40] Shieh, G. (1992), "Boss" Island: The Subcontracting Networks and Micro-Entrepreneurship in Taiwan's Development, New York: Peter Lang Publishing, Inc.

[41] Shepherd, D.A., Douglas, E.J., and Shanley, M. (2000), "New Venture Survival: Ignorance, External Shocks, and Risk Reduction Strategies", Journal of Business Venturing, Vol. 15, No. 5-6, pp. 393-410.

[42] Singh, J.V., Tucker, D.J., and House, R.J. (1986), "Organizational Legitimacy and The Liability of Newness", Administrative Science Quarterly, Vol. 31, pp. 171-193.

[43] Small and Medium Enterprise Administration (2007). SMEA report 2005-2007, http://www.moeasmea.gov.tw/mp.asp?mp=2, accessed 2 August 2010.

[44] Stancill, J.M. (1986), "How Much Money Does Your New Venture Need?", Harvard Business Review, Vol. 64, No. 3, pp. 72-80.

[45] Stinchcombe, A.L. (1965), Social Structures and Organizations, Handbook of Organizations, Chicago, IL: Rand McNally, pp.149-193.

[46] Suzuki, K.I., Kim, S.H., and Bae, Z.T. (2002), "Entrepreneurship in Japan and Silicon Valley: A Comparative Study", Technovation, Vol. 22, No. 10, pp. 595-606.

[47] Terjesen, S, and Elam, A. (2009), "Transnational Entrepreneurs' Venture Internationalization Strategies: A Practice Theory Approach", Entrepreneurship Theory and Practice, Vol. 33, No. 5, pp. 1093-1120.

[48] The Israel Central Bureau of Statistics. (2001) http://www.cbs.gov.il/reader/?MIval=cw_usr_view_SHTML&ID=417, accessed 16 August 2010.

[49] Tipu, S. A. A. and Arain, F. M. (2010), "Managing Success Factors in Entrepreneurial Ventures: A Behavioral Approach", International Journal of Entrepreneurial Behaviour & Research, Vol. 17, No. 5, pp. 534-560.

[50] Yin, R.K. (1994) Case Study Research: Design and Methods, 2nd edition. CA: Sage Publication.