Singapore Venture Capitalists (VCs) Investment Evaluation Criteria: A Re-Examination

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ABSTRACT. The Venture capital (VC) industry in Singapore is of recent origin. However, funds under management in Singapore have grown from S$45 million in 1983 to S$7.86 billion in 1996. These developments together with the recent announcement of government's vision of Singapore becoming a hub for venture capital in the region provide an opportunity for an examination of the venture capital industry in Singapore. The VC industry originated in the Western Hemisphere in response to the need for risk capital for high technology industries. In the light of the differences in investment opportunities around Singapore, and the nature of industrial developments in South East Asia in general, the authors anticipated that the investment criteria employed by Venture Capital Firms (VCs) in Singapore would differ. The results however reveal that criteria adopted by Singapore VCs are not very different from those adopted by VCs in other countries including U.S. The results also confirm that the entrepreneur's characteristics or the top management's capabilities are seen as being primary indicators of the venture's potential. Further examination of VCs investment process revealed that the investment criteria adopted by successful VCs were no different from those adopted by less successful VCs. This confirms that investment selection is a multi-stage process wherein venture assessment is only one of the steps in this process. Before VCs evaluate a venture they screen investment proposals based on their investment preferences or investment strategies. VCs in our sample had definite ideas about where to invest and in what types of firms. How do VCs select appropriate investment strategies, however, has not been adequately dealt in the literature and is a fitting subject for further studies.

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Introduction

Singapore's venture capital industry has grown tremendously during the last decade. The government in Singapore took the lead in encouraging venture capital industry by making selective venture capital investments through the Economic Development Board (EDB). In 1991, EDB consolidated its venture capital activities by setting up a wholly owned subsidiary EDB Investments Pte Ltd. (EDBI) and launched two venture funds, EDB Ventures and Singapore Bio-Innovations with the explicit aim of investing in high-tech ventures in Singapore. These two venture capital funds were set-up by the Economic Development Board (EDB) with the aim of promoting high-tech ventures in Singapore. To attract VC firms to Singapore, the government also announced a number of tax and financial incentives, including financial support to VC firms for developing of VC professionals. In its 1995 survey of the venture capital industry, the EDB reported that the venture capital funds had grown rapidly from 1992 to 1994 and the funds invested had increased by almost 300% (EDB, 1995). Venture capital funds under management had increased to $7.86 billion in 1996 from a base of $45m in 1985. And during the same period, venture capital firms funded 260 companies, of which 38 went public with a market capitalisation of close to S$5.8 billion (EDB, 1997).

The development of venture capital industry in Singapore is mirrored in other Asian economies where a number of Asian governments, keen on promoting high-tech industries, have been very

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receptive to the idea of promoting venture capital industry to provide risk capital to the high technology ventures. South Korean government, for example, set up the Korean Development and Investment Corporation (KDIC) and Korean Technology Finance Corporation to invest in cutting edge technology firms. Similarly, the government of Taiwan and India set-up venture funds, primarily, to invest in technology ventures. In Japan, on the other hand, venture capital firms were established by banks, securities companies, trading companies and large industrial groups to pursue high-tech start-ups (Ray and Turpin, 1993).

Singapore's rise as a venture capital hub in South East Asia has been spearheaded by two complementary developments. First, the emergence of lower cost manufacturing centres in East Asia, in the rapidly growing second generation newly industrialised economies (NIEs), has placed competitive pressure on Singapore's manufacturing industry and hence the need to move up the technology ladder and promote high value technology intensive industries. Second, in pursuance of an economic diversification strategy, the EDB, Singapore embarked on a series of programmes to complement Singapore's role as a regional centre for finance, trade and industry and venture capital industry fitted in this scheme.

Singapore's potential for developing a venture capital industry has been noted by many (Patricof, 1989; Scheela, 1994). Patricof (1989) lists four criteria for the emergence of significant venture capital activity: existence of a strong secondary market, a favourable tax structure, a flexible labour market and an enterprising culture, which are all present in Singapore. Whilst there is some work on venture capitalists in Asia, there is little information about the venture capitalists and their operations in Singapore. A few case studies of VCs in Singapore (Chia and Wong, 1989; Scheela, 1994) do exist, which review investment objectives, philosophies, appraisal procedures and investment criteria of the venture funds. But these studies are not comparable and have limited generalizability.

In recent years investment evaluation criteria for new ventures has received a great deal of attention and has been a well-researched subject in many countries. Again, little is known about the criteria employed by VCs in Singapore. Ray (1991) reviewed the evaluation criteria adopted by Singapore VCs, but his sample (5) was quite small. Considering that, over the years, the number of VCs in Singapore have increased (58 in 1995), a study at this stage would help overcome the limitation of a small sample, particularly if all the VCs in Singapore were targeted. The intent of this study is to obtain a clearer insight into the venture evaluation criteria used by the venture capital community in Asia as represented by the Singapore industry.

It is anticipated that the investment criteria employed by the VCs in Singapore will differ from those adopted in the western countries. The literature on the decision processes indicates that funding decisions are influenced by many factors both internal and external to the firm (Schilit and Chandran, 1993). East Asia represents a very different socio-cultural, economic, legal and regulatory environment. The findings of the study would therefore, be of immense benefit to the venture capitalists around the world, particularly to those investing and seeking opportunities in Asia, and to entrepreneurs and academics.

Singapore is also peculiarly placed as far as VC industry is concerned. Being a small country with limited internal markets for high technology finance, the VC industry has to target markets beyond its borders. Therefore, its potential to develop as a venture capital centre depends on the ability of VCs in Singapore to identify, evaluate and invest in ventures with high growth and profit potential in the region. Considering the globalisation of financial markets and international flows of risk capital, Singapore thus offers an interesting case study to researchers.

Literature review

The growth of the venture capital industry was accelerated by the early success of U.S. Venture capitalists in posting extra-ordinary returns of 40% to 80%. In early years some VCs posted returns running as high as 318% (Huntsman and Hoban, 1980). The fact that the venture capital funds were instrumental in promoting some of the leading high technology firms further enhanced the role of VCs for creation of the enterprises of the future. In recent years VCs have discovered that the returns have plateaued and to succeed in this

high-risk and high-return game they not only need to identify ventures with high profit potential but also develop skills in picking the winners. Hence, the interest in learning more about the investment decision processes and the criteria adopted by venture capitalists.

Venture evaluation criteria

The dominant stream of research relating to the investment decision process has focused attention on developing a set of venture evaluation criteria (Wells, 1974; Tyebjee and Bruno, 1984; Hall and Hofer, 1993; and Rah, Jung and Lee, 1994, Poindtexter, 1976; MacMillan, Seigal and Subba Narasihma, 1985). It has been argued that understanding the criteria employed by successful venture capitalist in evaluating new ventures would provide venture capitalists a useful framework for evaluating entrepreneurial ventures and reduce the failure rates of the new ventures they finance.

Following in the footsteps of Tyebjee and Bruno (1984), who identified a set of evaluation criteria, a number of studies were conducted to confirm their findings. While these studies provided some new insights, they yielded almost the same set of investment evaluation criteria. Hall and Hofer (1993), for example, present a two stage selection process and identify 18 criteria used by VCs at the proposal screening stage and 12 criteria adopted at the proposal assessment stage. MacMillan et al. (1985), based on interviews with 14 venture capitalists in U.S., came up with a list of 27 criteria. They categorised them into six sets, namely, (i) entrepreneurial personality, (ii) entrepreneurial experience, (iii) characteristics of product or service, (iv) characteristics of market, (v) financial characteristics and (vi) venture team. Further attempts to refine the criteria and determine the weightage that the venture capitalists accord to different criteria, in their investment decisions, revealed that the criteria dealing with the "entrepreneurs personality" and "entrepreneurs' experience" rather than "product", "market" and "financial" considerations were the key determinants in the funding decision (MacMillan et al., 1985).

Is there then a unique set of criteria, which can be used for "venture evaluation" in all settings? Some researchers approached this question from a different perspective, arguing that, since the venture capitalist's primary role is to manage risks of the proposed venture, the evaluation criteria are a mechanism for assessing the riskiness of the project. By this reckoning to be generalizable, the evaluation criteria should include assessment of all type of risks faced by the venture (Driscoll, 1974; MacMillan et al., 1985). MacMillan et al., drawing from the factor analysis of the data they obtained, identified six categories of risks: risk of losing the entire investment, risk of being unable to bail out, risk of failure to implement the idea, competitive risk, risk of management failure, and risk of leadership failure. These risks stem from two sources: factors internal to the firm, i.e., its management and its leadership, and factors outside the domain of the firm, i.e., the industry its operates in, the markets and the competitors. Since the operating environments, particularly, the openness and availability of information is limited in East Asia, logic would suggest that VCs operating in such economies would weight the evaluation criteria differently.

Using similar logic, Carter and Van Auken (1994) attempted to relate venture evaluation criteria to the stages of venture development. They argued that the risk profile of early stage investments being different from that of the late stage investments the VCs would factor this in their evaluation criteria. Again they did not find any significant difference between the criteria adopted by the early stage investors and the late stage investors.

Influenced by the legal and economic environments, the market structures and the operating financial systems, the risks faced by venture capitalists operating in different countries should differ and these differences will show in inter-country comparisons of evaluation criteria. VC researchers thus favoured inter-country comparison and many of them used the instrument developed by Macmillan et al. (1985) to compare the rankings of the criteria with the results obtained from the U.S. sample. Knight (1994) replicated MacMillan study in Canada and found that the Canadian VCs employed criteria similar to those discovered by MacMillan and the importance rating was not very different. These and other studies (Hall and Hofer,1993; Knight,

1986; Carter and Van Auken, 1994) confirmed that VCs in the west utilise a common set of evaluative criteria for investment decisions and the entrepreneur's "experience" and "personality" were the most highly rated criteria.

Studies were replicated in other countries; U.K. (Sweeting, 1991), Singapore (Ray, 1991), Japan (Ray and Turpin, 1991), South Korea (Rah, Jung and Lee, 1994) and Europe, (Riquelme, 1994) to test for differences. Knight (1994) conducted studies over a period of time and presents cross-cultural comparisons from countries including U.S.A., Canada, Asia-Pacific and Europe. But these cross-country studies also concluded that the investment evaluation criteria in different countries bear striking similarity and that the "entrepreneurs' personality and experience" stood out as the most important factor in investment decisions.

While the findings so far, confirm the importance of the entrepreneurial characteristics, one limitation in the Asian studies is that the number of venture capital firms covered have been quite small: Singapore 5 (Ray, 1991), Korea 20 out of a population of 50 (Rah et al., 1994) which include start-up investment companies, and only 15 out of 70 in Japan (Ray and Turpin, 1993). This research tried to overcome the sample size limitation by obtaining a larger and more representative sample of the venture capital funds in Singapore. The nature of the venture capital industry in Singapore being different from that in U.S. or Canada (Allampalli, Gibbons, Tan and Zutshi, 1996), the research study therefore, provides a useful benchmark for cross-country comparisons.

Research methodology

Methods in the earlier studies ranged from survey research to use of interview techniques with verbal protocol analysis. Some of these studies also elicited perceptual responses (MacMillan et al., 1985) and deal specific responses (Tyebjee and Bruno, 1984; Hall and Hofer, 1993; Rah, Jung and Lee, 1994) to add specificity to their findings. Multi-method (case analysis, study of administrative records, published interviews, questionnaire and personal interviews) approach has also been used (Riquelme, 1994) to enhance understanding of investment criteria and also extend it to other aspects of the investment process like deal structuring and divestment.

Considering the developing nature of this industry and the small number of VCs in Singapore, the authors decided to utilise self-reported data to study the investment evaluation criteria of VCs in Singapore. This approach has some inherent limitations, such as, biases and inaccuracies of re-call associated with self-reported measures. However, researchers measuring financial performance of new and emerging businesses have used founder reported or self-report data to study the collective performance. Chandler and Hanks (1993) provide evidence for accuracy, external validity and reliability of founder-reported data. They also found that relevance, reliability, internal consistency, is either "acceptable" or "very good" in such cases. Only inter-rater reliability was found to be marginal. To ensure that respondents treated the research instruments with appropriate seriousness and provided accurate answers, the authors in this survey followed up on each VC in the sample with telephone calls.

A mail survey was employed to obtain the information required. The research instrument was developed to elicit information on the size of the venture capital firms, their investment priorities, time horizons and investment criteria. The instrument used the investment criteria as developed by MacMillian et al. (1985). Of the 16 empirical papers reviewed, half of them had utilized the survey instrument developed by MacMillan et al. (1985) for this purpose. The five categories of investment criteria include: entrepreneur's personality, entrepreneur's experience, characteristics of the product or service, characteristics of the market, and financial characteristics. In addition, criteria on country risk and venture team were also included. Criteria regarding venture team were part of the instrument developed by MacMillan (1985) but not reported in the subsequent research studies by Knight (1986) and Ray (1991). Country risk, as an additional set of criteria, was felt to be relevant in the light of Singapore's venture capital industry being a hub for regional economies (Allampalli, Gibbons, Tan and Zutshi, 1996). The criteria were ranked on a four point Likert-like scale: (1) irrelevant, (2) desirable, (3) important, and (4) essential.

Prior to distributing the survey, the chief executives of the VCs in Singapore, as listed in the EDB Directory of Venture Capital, were contacted and informed about the objectives of the survey. The questionnaire was then sent directly to the chief executive officers of the VCs, as it was expected that these individuals would be the most knowledgeable about their company's investment criteria and strategies. From a total population of fifty-eight VCs (EDB, 1995), thirty-one responded yielding a response rate of 53%, which is quite high. More important, the total amount of funds under management by the venture capital funds surveyed amounted to $3 billion, which represents 56.4% of the S$5.32 billion, the total funds under management at the beginning of 1995 (EDB, 1995). Hence the responses are quite representative of the population.

Findings

Demographics

In Singapore, there 58 VCs are listed in the Venture Capital Directory (EDB, 1995). The average amount of funds managed by the 31 respondents in our survey was approximately $110m. However, there was a wide dispersion in the size of VCs. In their sample of 149 U.S. VCs (belonging to Silicon Valley, Northern and Southern California, New York and Texas) Elango et al. (1995), found that the average size of the VCs was US$278.9 million, US$50.9 million and US$12.3 million for large, medium and small VCs respectively (based on their classification of VCs). The funds under management of the Singapore VC, in our sample, ranged from S$0.2 million to S$700 million, and the median size was S$90 million. Our data thus suggests that, if we follow the categorisation of Elango et al. (1995), the structure of the venture capital industry in Singapore is not very different from what they discovered in their U.S. sample. The mean values of the Venture Funds in Singapore and United States (Table I) show a close resemblance despite non-equivalent currency. Moreover, the proportions of firms across the three categories are also similar. This establishes some equivalence for inter-country comparison of the VCs investment decisions in the sections ahead.

Nature of investments: high-tech versus low-tech

Venture capital in developed countries has been associated with high-technology "start-up" companies. In the U.S., it has been argued that the competitiveness of U.S. technology based industry hinges on venture capital. In the early eighties, more than 70 percent of the venture funds in U.S. were disbursed to technology related industries (Bygrave and Timmons, 1992). Our findings reveal that in Singapore the nature of investments are different. A substantial proportion (44%) of the investments in Singapore is in low-tech projects. Only 56% of the total investments are in high-tech projects and the investments in high-tech projects in Singapore amount to only 13% of the total investments (Table II). This would suggest that the investment strategy adopted by VCs in Singapore is different from that adopted by venture capitalists in the developed countries where investments are more in technology intensive projects.

TABLE I
Grouping of venture capital funds in Singapore (in S$ millions)

Grouping of venture capital funds	Singapore[a]		United States[b]	
	Number	Mean (SGD)	Number	Mean (USD)
Small (< 25 million)	27%	12.05	28%	12.345
Medium (> = 25 but < 100 million)	37%	54.53	40%	50.962
Large ($>$ 100 million)	36%	230.80	32%	278.91

[a] Singapore – 30 reported out of 31.
[b] United States – 143 reported out of 149 venture capital funds.

TABLE II
Structure of investments of Singapore VCs

VCs investments	Technology		Total (%)
	Low-tech (%)	High-tech (%)	
Inside Singapore	19	13	32
Outside Singapore	25	43	68
Total	44	56	100

Regional versus local investments

Given the importance that the government attaches to making Singapore as a financial centre for East Asia, the questionnaire sought detailed information regarding geographical and industrial foci of the funds. It was found that the VCs on the average invested 32% of the funds within Singapore. On the other hand large number of VCs made investments in the region. As Table III reveals, Singapore venture capital funds were most active in Malaysia, Indonesia and Thailand.

A few comments are necessary on the extent of regional investments. Prior research suggests that geographical proximity is important to VCs, particularly, for the technology-oriented venture capital funds (Florida and Kenney, 1988a, b). Gupta and Sapienza (1992) also found that the early stage investors prefer to invest close to home. Elango et al. (1995) on the other hand maintain that finance-oriented venture capital funds are involved in activities similar to traditional financial activities. Hence they are more comfortable with late stage investments and are more likely to invest away from home location. However, our findings suggest that this does not hold true in the case of Singapore. Singapore is a small country with limited availability of new investment opportunities, the high proportion of investments outside Singapore (average of 68%) is not surprising. Growth in the number of venture capital funds in Singapore has forced them to look for investment opportunities outside Singapore. But a large percentage of VC investment outside Singapore is in high-tech industry (43% of total investment). Again the investment strategies adopted by Singapore VCs appear to be quite different from what is observed in the case of VCs in U.S. (Flordia and Kenney, 1988; Gupta and Sapienza, 1992).

TABLE III
Countries where VCs investments are currently "active" and "very active"

Sr. No.	Country	Involvement rated as active and very active	
		Frequency	Percentage
1	Malaysia	23	74.2
2	Indonesia	22	71
3	Thailand	22	71
4	China	15	48.4
5	Philippines	13	42

Investment criteria used by venture capitalists in Singapore

The mean responses for the investment criteria are consolidated in Table IV. Findings from Knight (1994) in United States, Europe and Asia-Pacific and Canada, have been included for the purposes of comparison. Only those criteria, which were rated as "important" or "essential" in at least one of these surveys, are reported in the Table IV. The criteria are organised based on MacMillan's (1985) classification with the exception that his two categories, entrepreneurial personality and entrepreneurial experience, have been merged into one. We thus have four rather than five categories.

The VCs in U.S. appear to pay attention to a larger number of factors. Thus, ten out of the twelve criteria are rated as important in the U.S. sample while in the case of the Canadian sample only five of the twelve criteria are important. Four of these criteria are associated with the entrepreneurs and only one is related to the product. In the Singapore sample, eight out of twelve criteria were rated as being important. Thus Knight's (1994) observation that American venture capitalists appear to be more demanding when evaluating investments may hold true for the Singapore VCs as well. A careful study of Table IV shows that, for the venture capitalists in all these countries, the entrepreneur (the entrepreneurial personality and the entrepreneurial skills) is the focus of assessment as far as investment analysis is concerned. Singapore is no exception.

TABLE IV
Investment criteria: A comparative picture[a]

Investment criteria	Singapore	Asia-Pacific	United States	Europe	Canada
Entrepreneur					
1. Capable of sustained intense effort	3.58	3.74	3.60	3.55	3.56
2. Able to evaluate and react to risk well	3.52	3.45	3.34	3.57	3.31
3. Articulate in discussing venture	(2.61)	(2.77)	3.11	(2.77)	(2.74)
4. Be thoroughly familiar with the market targeted by venture	3.61	3.57	3.58	3.54	3.68
5. Demonstrated Leadership ability in past	3.52	2.98	3.41	3.18	3.01
6. Has a track record relevant to venture	3.39	2.92	3.24	3.03	(2.68)
Market					
7. The target market enjoys a significant growth rate	3.35	3.15	3.34	3.00	(2.86)
Finance					
8. I require a return equal to at least 10 times my investment with-in 10 years	(2.84)	(2.94)	3.43	(2.86)	(2.56)
9. I require an investment that can be easily made liquid (e.g., taken public acquired)	3.00	(2.67)	3.17	(2.72)	(2.39)
Product					
10. The product is proprietary or can otherwise be protected	(2.94)	(2.64)	3.11	2.74	2.28
11. The product enjoys demonstrated market acceptance	3.10	(2.81)	(2.45)	(2.85)	(2.66)
12. The product has been developed to the point of a functioning prototype	(2.94)	(2.92)	(2.38)	(2.97)	3.05

( ) Scores rated below three on a scale of 1 to 4. 1 – Irrelevant, 2 – Desirable, 3 – Important and 4 – Essential.
[a] Only criteria rated as "important" (3) and above and reported in any of the above study have been included.

We also looked at the frequency distribution of the ratings associated with the investment criteria. The percentage of respondents who rated the investment criteria as "essential" is presented in Table V along with the values obtained by MacMillan (1985) in his U.S. sample. Comparing the rankings obtained in Singapore with those in U.S. it can be seen that the two are not very different. Only two of the factors, ranked among the top 10 in the Singapore sample, do not figure in the U.S. ranking. The top five criteria identified by the Singapore VCs to be the most important factors are all focused on the entrepreneur. The market, the product and the financial criteria appear lower in the rankings. Based on his limited sample Ray (1991) suggested that the investment criteria in Singapore comprised of a mix of entrepreneur and market criteria. While our study confirms Ray's (1991) finding that entrepreneur's staying power is one of the most important criteria for investor confidence, our findings show conclusively that the criteria adopted by Singapore VC are not very different from those used by VCs in other countries.

High-technology versus low-technology VCs

It was argued that high-technology ventures face different kinds of risks as compared to low technology ventures. Since a large number of Singapore VCs invest in high-technology ventures outside Singapore, which magnifies the risks that they face, do the investment criteria they adopt differ from those adopted by VCs investing mainly in low-techology ventures. Using the respondents' data regarding the proportion of investments in hi-technology ventures, the VCs were classified as hi-technology if the total proportion of investments if hi-technology ventures was above 51%. The VCs with lower proportion of investments were classified as low-technology. A *t*-test of the means was carried out to determine if there were significant differences in the criteria adopted by these two sets of VCs. Table VI presents the mean

TABLE V
Top ten investment criteria: most frequently rated as essential

Criteria	Singapore studies in 1995 and [1991][a]		U.S. study[b]	
	Rank	Percent	Rank	Percent
Thoroughly familiar with the market targeted by venture	1 [6]	67.7 [40]	2	62
Capable of sustained intense effort	2 [1]	61.3 [80]	1	64
Demonstrated Leadership ability in past	3 [7]	58.1 [40]	4	50
Able to evaluate and react to risk well	4 [2]	54.8 [40]	5	48
Has a track record relevant to venture	5	45.2	8	37
The target market enjoys a significant growth rate	6	38.7	7	37
The product enjoys demonstrated market acceptance	7	35.5	Did not figure[c]	
I require an investment that can be easily made liquid (e.g. taken public acquired)	8	29.0	6	44
The product has been developed to the point of a functioning prototype	9	25.8	Did not figure[c]	
I require a return equal to at least 10 times my investment within 10 years	10	22.6	3	50

[ ] Results reported by Ray (1991). Only 4 criteria were among the top ten identified in the 1995 study.
[a] Results reported by Ray (1991) in his Singapore study.
[b] MacMillan et al. study of 1985.
[c] Did not figure in the first 10 ranks.

TABLE VI
T-test on investment criteria for high-technology and low-technology VCs

Criteria	High-technology [Mean – 8]	Low-technology [Mean – 11]	*F* value	Result
Thoroughly familiar with the market targeted by venture	3.38	3.82	2.960	Significant
Capable of sustained intense effort	3.25	3.91	7.876	Significant
I require an investment that can be easily made liquid (e.g. taken public acquired).	3.00	3.09	4.319	Significant
The product has been developed to the point of a functioning prototype	3.00	3.18	2.466	Significant

values of criteria where significant differences existed between the two sets. The results suggest that in the case of low-technology ventures the VCs place somewhat higher weightage on product-market characteristics. But it does not change the order of importance attached to the investment evaluation criteria.

We thus conclude that whenever reliable product-market information is available VCs place somewhat higher weightage on those factors. However considering that VCs invest in high risk ventures they still pay greater attention to the entrepreneurial characteristics than to the economics of the project in all cases.

Investment criteria and success

Not many researchers have gone beyond identifying the criteria to determine whether investment analysis based on these criteria helps in selecting potentially successful ventures. Macmillan, Zemann and SubbaNarasihma (1987) attempted this by correlating the *a priori* ranking on the venture investment criteria with the performance of the ventures. They asked venture, capitalists to select ventures, that they had funded, differentiated between the successful and unsuccessful ventures and correlated their performance with their *a priori* rating on the investment criteria. They did not find any significant difference in the ratings assigned to successful and the unsuccessful firms, suggesting that investment criteria used for

investment evaluation do not have predictive capability. This raises serious questions about the utility of the investment criteria. But, as they point out, one of the major limitations of their study was that it was confined to projects which had passed the selection process and therefore did not take into account the fact that the investment evaluation process would have helped VCs filter out ventures with low probabilities of success.

One way of overcoming this limitation is to compare VCs who have been successful in investing in high-growth ventures with VCs who have not been as successful in their selection of high-growth ventures. One can argue that if the investment criteria are developed with the purpose of filtering out ventures with low growth potential, then the successful VCs should be using investing criteria different from those used by not-so-successful VCs.

To test this proposition, we divided our sample of VCs into two groups. The more-successful VCs and the less successful VCs. This division was made on the basis of the performance of their portfolio of ventures. Those who had invested in high performing ventures were considered more successful VCs and VCs whose ventures did not perform to their satisfaction were termed as less successful VCs. The VCs were asked to indicate what percentage of their investments were in ventures whose performance was (i) extremely poor, (ii) significantly worse than expected, (iii) worse than expected, (iv) achieved expectations, (v) better than expected, (vi) significantly better than expected, and (vii) outstanding. These categories were converted into an interval scale ranging from 1 to 7 wherein 1 represented "extremely poor" and 7 represented "outstanding". Using decision theoretic approach (Zutshi, 1981) a performance score for each VCF was computed by multiplying the performance rating with the weightage assigned as deduced from the percentage of investments in that category.

Based on the score so computed, the VCs were divided along the median into two groups: more successful VCs and less successful VCs. Out of 31 respondents 27 provided the information on the performance of their portfolio of ventures. Independent sample *T*-tests were carried out to determine if these two groups differed significantly in terms of the investment criteria that they used (Table VII).

Again, we did not find any significant differences in the investment criteria adopted by the VC's with high performing portfolio as against that adopted by the VCs with low performing portfolio. The only significant difference was in relation to "demonstrated leadership ability in the past". The more successful VCs, it seems, assign greater importance to capability for sustained intense effort while the less successful VCs are more focused on leadership. But the differences are marginal.

TABLE VII
Performance of VCs: *T*-tests for top ten investment criteria

Criteria	More-successful [Mean]	Less-successful [Mean]	*F* value	Result
Thoroughly familiar with the market targeted by venture	3.64	3.69	0.603	Not significant
Capable of sustained intense effort	3.71	3.54	0.190	Not significant
Demonstrated leadership ability in past	**3.50**	**3.62**	**2.577**	**Significant**
Able to evaluate and react to risk well	3.57	3.38	1.084	Not significant
Has a track record relevant to venture	3.29	3.54	0.24	Not significant
The target market enjoys a significant growth rate	3.29	3.31	0.126	Not significant
The product enjoys demonstrated market acceptance	2.86	2.85	0.942	Not significant
I require an investment that can be easily made liquid (e.g. taken public acquired)	3.07	2.92	0.41	Not significant
The product has been developed to the point of a functioning prototype	3.14	2.69	1.446	Not significant
I require a return equal to at least 10 times my investment within 10 years	2.71	2.85	1.836	Not significant

Discussion

We find that Singapore VCs adopt investment evaluation criteria very similar to those employed VCs in other countries. The importance attached to "entrepreneur's personality" and "entrepreneurs' experience" in assessing the venture is also remarkably similar between Singapore, Asia-Pacific, Europe and U.S. Such commonality in investment evaluation criteria, suggests that there is a shared perception among VCs across the world that in the case of high risk investments, evaluating the capabilities of the entrepreneur is most important to ensure reasonable reward for risks, liquidity and safety of the investment. There is also a broad consensus on the relative importance of other factors, such as, market, product and financial characteristics.

One could argue that this commonality may be owing to the influence that U.S. venture capital firms exert on many countries as they have joint venture with local venture capital firms, e.g. OCBC Wearnes & Walden Management (S), Hambrecht & Quist, etc., in Singapore. Yet the Singapore VCs are very different from their counterparts in other countries, particularly in their investment behaviour. For, example, while a large majority of VCs in U.S. invest in high-technology ventures a large percentage of investments of Singapore VCs are in low-technology ventures. Similarly, the Singapore VCs invest a greater percentage of their funds in the region rather than in Singapore. Yet we find no significant difference in the investment evaluation criteria they employ.

The debate on the investment criteria has to move forward. A number of questions remain which have not been adequately addressed. What type of qualitative assessment do venture capitalists perform in different cultural settings when reviewing factors such as entrepreneurial personality? Is an assessment based on these evaluation criteria sufficient for investment evaluation? Does such an evaluation enhance the probability of selecting the winning proposal? Should VCs go beyond these factors when assessing the venture proposals and what are these other factors?

Obviously the VCs are selective about their investments. Maire and Walker (1987), for example, found that 53% of venture capitalists in their sample funded less than 1 percent of the requests they received. Considering that there are large number of VCs competing for a small number of venture proposals that have high growth potential, and that most VCs are lean organisations, they would have to be discriminating and very careful in whatever selection process they adopt.

The search for a preferred set of evaluation criteria has, essentially, focused attention on deal evaluation rather than on investment decisions. It is now accepted that the investment decision process is a multi-stage process and attempts have thus been made to go beyond identification of a set of venture assessment criteria to developing more exhaustive models of investment decision process (Tyebjee and Bruno, 1984; Schilit and Chandran, 1993; Sweeting, 1994; Hall and Hofer, 1993). In one of the earlier studies, Tyebjee and Bruno (1984) suggested a five-stage investment decision process starting with: (i) deal origination, (ii) deal screening, (iii) deal evaluation, (iv) deal structuring, to (v) post-investment activities. It suggests that distinct activities are involved. First determining what type deals to accept. Second evaluating the deal. Finally, structuring and post-investment activities.

Hall and Hofer (1993) reviewed the evaluation and selection process of 4 VCs and 16 proposals. Based on their limited sample, they suggested that investment evaluation was a two stage process; first, assessing the venture's fit with the VCs portfolio and the second, assessing the potential of the venture. They found that at the first stage, the proposal for investment is evaluated against the "lending guidelines" as well as "long-term growth and profitability" of the industry and estimated that the VC spent 6 minutes on screening the investment proposal (stage 1) and 12 minutes on assessment (stage 2) to reach a GO/NO-GO decision.

If we accept that investment decision process is a multi-stage process then, as Wells (1974) points out, many other factors which have a bearing on investment evaluation and selection need to be studied and their impact on the success of VCs portfolio evaluated. For example, studies on investment preferences of VCs have concluded that venture capitalists have definite preferences regarding the nature of the industry, stages of venture development, size of investment, geo-

graphic location, and the nature of technology (Carlton and Cooper, 1982; Bygrave, 1987; Deutschman, 1988). The VC preferences have important bearing on venture investment decisions. Similarly, the fact remains that the venture capitalists not only provide finance but also technical and networking support to the fledgling enterprises. Hence, the success of the venture depends not only on the nature of the proposal but also on the investment strategy that the VC employs: its sectoral and technological competencies and how it selects project proposals that fit-in with its portfolio and its expertise. Many of the VCs in our sample were explicit about the industry in which they would invest. Similarly, most of the VCs also had a clear focus on the countries in which they were interested in investing. Some of the venture funds were specifically earmarked for particular countries, such as, Mynamar fund and Vietnam fund. The results suggest that based on the prevailing conditions and VCs own internal situation venture capitalists develop investment preferences and it is these preferences that help them in screening the venture proposals. Therefore, the answer to why some VCs are more successful than others may be found in the fit or appropriateness of the investment strategy of the venture capital firm rather than the criteria that it uses to evaluate the deals.

Conclusion

The venture capital industry in Singapore is still at the stage of development seeking to fulfill the role set by the policy makers who desire to see Singapore become the hub for venture capital in the region. The study shows that Singapore VCs have extended their reach in the region and more than fifty percent of the investments of the respondents are made outside Singapore. Similarly, VCs in Singapore are less inclined to invest in high technology ventures. Thus the VCs in Singapore have very different investment preferences as compared to VCs in U.S.

Whilst the investment preferences differ, the investment criteria are similar. The results reveal that investment evaluation criteria adopted by Singapore VCs are not very different from those adopted by VCs in other countries including U.S. The results confirm that the entrepreneur's characteristics or the top management's capabilities are seen as being important indicators of the venture's potential.

The authors found that VCs in the sample had definite ideas about where to invest and in what types of firms. The differences in the investment preferences may be explained by the environment in which the VCs operate. The venture selection was thus based not only on the venture related criteria, such as, the entrepreneur, the product or the market but also on the pre-determined preferences or strategies of VC's which guide their search for new ventures. To be successful, VCs design and develop their investment strategies and they then make conscious decisions about where to invest, in what sectors, at what stage and in what technologies. The type of decision-making process (i.e. centralised or decentralised) and the location of the final decision (whether in Singapore or at a different HQ) may also influence the decisions made by the VCs. The authors did not examine these factors. Understanding VCs investment strategies and how they impact on the success of new ventures, it would seem, is a fruitful area in need of research.

Appendix I

Nanyang Technological University – Entrepreneurship Development Center (ENDEC)

A Profile of Venture Capital Firms (VCF) in Singapore

About yourself: Please let us have some details about you and your organization (tick one).

Ours is a
- Venture Capital Firm (VCF) that direcly invests and managers own funds.
- VCF that invests and managers others funds.
- Government promoted VCF.
- Corporate VCF.
- Bank supported VCF.
- Privately held VCF.
- Others _____

My title within the firm is (Optional) _____

1.0. Venture Capital Industry – Demographics

1.1. Total amount of funds managed under your VCF as on December 1995 are S$ _____ millions?

1.2. What percentage of above funds are invested in Singapore? _____ %

1.3. Our VC firm has pioneer service incentive of the EDB for venture capital firms? _____ Yes _____ No

1.4. Please indicate below the relative importance of each of the investment philosophies listed, by allocating a percentage of 100 points across each alternative. The number of points allocated should reflect the relative importance of each alternative and should total 100%.

a) Our VCF invests in "high-tech" industries in Singapore. _____
b) Our VCF invests in "high-tech" industries outside Singapore. _____
c) Our VCF invests in "low-tech" industries in Singapore. _____
d) Our VCF invests in "low-tech" industries outside Singapore. _____

Total 100%

1.5. How important is each of the following objectives for your VCF: (Circle one)

Objectives	*Not very Important*	*Not Important*	*Somewhat Important*	*Important*	*Very Important*
a) 5 times original investment in 5 years	1	2	3	4	5
b) Downstream public offering	1	2	3	4	5
c) 25–40% compounded after tax annualized gains	1	2	3	4	5
d) Acquire under valued assets	1	2	3	4	5
e) Acquire new windows on technology	1	2	3	4	5
f) Acquire new markets	1	2	3	4	5

1.6. The average deal size of your current portfolio of ventures is . . . . . (please circle one)
a) S$1 million or less
b) S$1–3 million
c) S$3–5 million
d) S$5–10 million
e) S$10–20 million
f) S$20–50 million

1.7. What is your preferred average deal size? (please circle only one)
a) Under S$1 million
b) S$1–3 million
c) S$3–5 million
d) S$5–10 million
e) S$10–20 million
f) S$20 million

1.8. What is the average number of deals you are currently presented with per month arising from all sources and before any investigation takes place? (please circle one)
a) < 5
b) 5–10

c) 10–20
d) 20–30
e) 30

1.9. Number of professionals in our VCF is (please tick appropriate)

Less than 5 6–10 11–20 21–30 31 and above

1.10. Please indicate below(tick) the nature of your VCF's involvement in the countries from where you source your investment deals.

Country	*Not interested*	*Not currently covered*	*Not currently covered BUT considering*	*Active*	*Very active*
1. Malaysia					
2. Indonesia					
3. Thailand					
4. Philippines					
5. Vietnam					
6. Cambodia					
7. Mynamar					
8. Laos					
9. Taiwan					
10. Korea					
11. China					
12. India					
13. Pakistan					
14. Sri Lanka					
15. Australia					
16. New Zealand					
Investments in regions					
17. U.S.A. and Europe _____					
18. Other _____					

1.11. Identify 3 geographical areas will you be emphasizing the most in the next 2 years, in order of importance?

1. _____ 2. _____ 3. _____

1.12. Please circle the importance of each of the following sources of potential deals to your firm(tick one):

Sources	*Very important*	*Somewhat*	*Not important*
1. Personal contacts			
2. Cold calls from companies			
3. Agents			
4. Cold calls by you to target companies			
5. Other deal sourcing method: _____			

1.13. Please circle your interest level for investing in the following industries/sectors:

Area of business	*Not interested*	*Not currently covered*	*Not currently covered BUT considering*	*Active*	*Very active*
1. Agribusiness					
2. Energy					
3. Electronics					
4. Telecommunication					
5. Computer Software					
6. Computer Hardware					
7. Transportation					
8. Engineering					
9. Healthcare					
10. Food & food processing					
11. Leisure/entertainment					
12. Services					
13. Property development					
14. Other industries you are highly interested in: _____					

1.14. Looking to the following exit plans, how important is each for your Venture Capital Firm's exit strategy. (Circle appropriate)

	Not very not important	*Somewhat important*	*Important*	*Very important*	*Exit plan important*
a) IPO	1	2	3	4	5
b) Sell shares to other company	1	2	3	4	5
c) Sell to another investor	1	2	3	4	5
d) Liquidate the company	1	2	3	4	5
e) Other _____	1	2	3	4	5

2.0. Venture Capital – Firms Focus

2.1. Descriptions of several alternative investment stages are given below:
Please indicate what percentage of your *VCF's current total investments* is accounted for at each investment stage. Your answers should total 100%.

		Percentage
Stage 1	Seed and 1st round of financing	_____
Stage 2	Early growth and 2nd round of financing	_____
Stage 3	Major expansion and 3rd round of financing	_____
Stage 4	Leveraged Buy-outs and pre-IPO	_____
Stage 5	Acquisition of businesses and mergers	_____
	Total	**100%**

2.2. Which of the following statements *best* describes the strategic management style used by your VCF with respect to your investee companies: (Please tick one)

[ ] Our VCF participates in and influences the development of business strategy of the firm by establishing a planning process and contributing to strategic thinking. Also, VCF places less emphasis on financial controls and performance budgets are set flexibly, and reviewed within the context of long-term progress.

[ ] Our VCF is concerned with the plans of investee business units, but believes in autonomy for business. Plans are reviewed in a formal planning process but the VCF does not advocate strategies or interfere with major decisions. Control is maintained by the use of financial targets and strategic objectives. These are agreed with the VCF, and business managers are expected to meet the standards

[ ] There are no long-term planning systems and no planning documents. VCF limits its role to approving investments and budgets, and monitoring performance. Targets are expected to be stretching and once they are agreed, they become-part of a "contract" between the VCF and the investee.

3.0. Venture Capital Industry

3.1. Listed below are statements about the future of the venture capital industry in Singapore. It has been suggested that each factor will see a gradual *increase* over the next 5 years. Please indicate your agreement or disagreement on each factor by circling the appropriate number.

Factors that will increase	*Strongly disagree*	*Disagree*	*Disagree*	*Neutral*	*Strongly agree*
1. Overall rate of return on investments	1	2	3	4	5
2. Average percentage of ownership held by venture capitalists	1	2	3	4	5
3. Number of small venture capital firms	1	2	3	4	5
4. Number of private, independent venture capital firms	1	2	3	4	5
5. Overall number of venture capital firms	1	2	3	4	5
6. Start-up investments as a percentage of total investments	1	2	3	4	5
7. Number of ventures per venture capital portfolio	1	2	3	4	5
8. V C competition from firms in the "financial services industry"	1	2	3	4	5
9. Size of Venture Capital Firm (VCF)	1	2	3	4	5

Factors that will increase	*Strongly disagree*	*Disagree*	*Disagree*	*Neutral*	*Strongly agree*
10. Breadth and depth of technical/ managerial services offered by VCF	1	2	3	4	5
11. Specialization of VCF	1	2	3	4	5
12. "Fit" of venture with VCF's existing portfolio	1	2	3	4	5
13. Length of time required for investment decision	1	2	3	4	5
14. Size of investment per venture	1	2	3	4	5
15. Length of time a VCF will retain a firm in portfolio	1	2	3	4	5

4.0. Venture Capital Industry – Investment Criteria

Please indicate the extent to which your VCF uses the following criteria for evaluating a venture proposal. (Please circle the appropriate number)

	Criteria	*Irrelevant*	*Desirable*	*Important*	*Essential*
4.1.	The entrepreneur				
	1. Capable of sustained intense effort	1	2	3	4
	2. Able to evaluate and react to risk well	1	2	3	4
	3. Articulate in discussing venture	1	2	3	4
	4. Attends to detail	1	2	3	4
	5. Has a personality compatible with mine	1	2	3	4
	6. Is thoroughly familiar with the market targeted by venture	1	2	3	4
	7. Demonstrated Leadership ability in past	1	2	3	4
	8. Has a track record relevant to venture	1	2	3	4
	9. Was referred to me by a trustworthy source	1	2	3	4
	10. I am already familiar with the entrepreneur's reputation	1	2	3	4
	11. The product is proprietary or can otherwise be protected	1	2	3	4
	12. The product enjoys demonstrated market acceptance	1	2	3	4
	13. The product has been developed to the point of a functioning prototype	1	2	3	4
	14. Product may be described as "high tech"	1	2	3	4
	15. The target market enjoys a significant growth rate	1	2	3	4
	16. The venture will stimulate an existing market	1	2	3	4
	17. The venture is in an industry with which I am familiar	1	2	3	4
	18. There is little threat of competition during the first three years	1	2	3	4
	19. The venture will create a new market	1	2	3	4
4.2.	Financial considerations				
	20. I require a return equal to at least 10 times my investment with-in 10 years	1	2	3	4
	21. I require an investment that can be easily made liquid (e.g. taken public acquired)	1	2	3	4
	22. I require a return equal to at least 10 times my investment within at least 5 years	1	2	3	4
	23. I will not be expected to make subsequent investments	1	2	3	4
	24. I will not participate in latter rounds of investment (requires my participation in the initial round of investment)	1	2	3	4

	Criteria	*Irrelevant*	*Desirable*	*Important*	*Essential*
4.3.	The venture team				
	25. The venture is initiated by one person with the relevant experience to his proposed investment idea	1	2	3	4
	26. The venture is initiated by more than one individual, each having similar relevant experience	1	2	3	4
	27. The venture is initiated by more than one individual. The individuals constituting a functionally working management team	1	2	3	4
	28. None of the above are essential for venture to go forward	1	2	3	4
4.4.	Country risk criteria				
	29. Political risk	1	2	3	4
	30. Foreign exchange risk	1	2	3	4
	31. Foreign exchange control risk	1	2	3	4
	32. Trade control risk	1	2	3	4
	33. Socio-cultural risk	1	2	3	4
	34. Other _____	1	2	3	4

5.0. Performance of investee companies

Given below are descriptions of the performance of your investee companies. Each of the descriptions may represent the performance of all or only a fraction or some of your investments. Please indicate below what percentage of your VCF's current total investments are in each category:

Extremely poor	Significantly worse than expected	Worse than expected	Achieved expectations	Better than expected	Significantly better than expected	Outstanding
☐	☐	☐	☐	☐	☐	☐

6.0. VCI – Investor Involvement

Compared to the other venture capital firms in Singapore, how extensively does your firm seek to contribute to the investee companies in your portfolio through the following activities:

I rate my firm as contributing . . .	*Much less*	*Less*	*Same*	*More*	*Much more*
1. Searching for candidates of management team?	1	2	3	4	5
2. Interviewing and selecting management team?	1	2	3	4	5
3. Negotiating employment terms with candidates?	1	2	3	4	5
4. Interfacing with investor group?	1	2	3	4	5
5. Developing professional support group?	1	2	3	4	5
6. Obtaining alternative sources of debt financing?	1	2	3	4	5
7. Obtaining alternative sources of equity financing?	1	2	3	4	5
8. Formulating business strategy?	1	2	3	4	5
9. Developing actual product or service?	1	2	3	4	5
10. Developing production or service techniques?	1	2	3	4	5
11. Selecting vendors and equipment?	1	2	3	4	5
12. Formulating marketing plans?	1	2	3	4	5
13. Testing or evaluating marketing plans?	1	2	3	4	5
14. Soliciting customers or distributors?	1	2	3	4	5
15. Monitoring financial performance?	1	2	3	4	5
16. Monitoring operating performance?	1	2	3	4	5
17. Serving as sounding board to entrepreneur team?	1	2	3	4	5
18. Motivating personnel?	1	2	3	4	5
19. Replacing management personnel?	1	2	3	4	5
20. Managing crises and problems?	1	2	3	4	5

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