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Abstract

This longitudinal study of new, technology based ventures studies how a founding team influences the organization choices, processes and ultimately the success or failure of the venture. The functional breadth of the founding team and the strength of the CEO are related to the success of the venture. Their influence is primarily through the initial selection of a product. Beyond that all companies in our sample, regardless of team breadth or CEO strength, follow similar organizational processes and conduct their missions effectively. The failure of the initial product is an irreparable blow, from which a successful recovery is unlikely.

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1. Introduction

Although venture capitalists clearly believe that management is a key determinant of a new venture's success (MacMillan, Zemmann and SubbaNarasimha, 1987), their views have received few empirical tests. The results, all from cross sectional studies, have varied from reasonably supportive (e.g. Eisenhardt and Schoonhoven, 1989; Roure and Keeley, 1990), to equivocal (Stuart and Abetti, 1987), to neutral (Sandberg and Hofer, 1987).

This study considers the linkage between management and performance through a longitudinal study of management teams in 15 new, technology-based companies. The 15 firms constitute a stratified sample representing the range of performances commonly found in venture capital portfolios. It focuses on the early years, through the point at which a company first achieves profitability, or closes down for failure to do so. It seeks to identify key events that are precursors to success or failure and, in turn, tie them to characteristics of the founding management team.

Prior Research

Adapting work from the field of strategic management, Sandberg and Hofer (1987) suggest that new venture performance is a function of entrepreneurship, industry structure and strategy. To test this, they use measures such as the founder's prior entrepreneurial experience, the state of an industry's evolution and whether a product is superior to competing offerings. Of these, the biggest challenge may be measuring "entrepreneurship" as evidenced by the failure of Sandberg and Hofer's measures to show an effect on performance.

In the mid-1980s, management teams, as contrasted with individual managers, received increasing attention (e.g. Hambrick and Mason, 1984) as influences on company performance, and measures of team ability were proposed. In subsequent empirical studies, diversity in tenure (Keck and Tushman, 1986); diversity in breadth of experience (Eisenhardt & Schoonhoven, 1989); functional diversity (Keck and Tushman, 1986; Roure and Keeley, 1990); extent of shared experience (Roure and Keeley, 1990); and combinations

thereof (Eisenhardt and Schoonhoven, 1989) have shown some ability to "explain" performance.

In addition to strategic management, the field of organizational behavior, and specifically the study of work groups (summarized in Hackman, 1987), should also have relevance to management teams in new ventures. Summarizing prior research in the field, Hackman describes a model in which a group's success is a function of three "process criteria": its level of effort, its knowledge and skills, and its performance strategies (i.e. the way in which it operates). Each of these in turn is determined by three groups of variables: the design of the group (its tasks, its membership, its norms), the organizational context (incentives, resources, information systems, etc.), and synergy (resulting from group member interactions).

Measures from strategic management studies, such as group heterogeneity or average experience, are a small element of Hackman's model, which describes group membership. However, they may imply a great deal about skills, norms, incentives, etc. Thus, Hackman's model provides a framework from which the links between group membership and group performance can be traced.

Connections Between Management and Performance

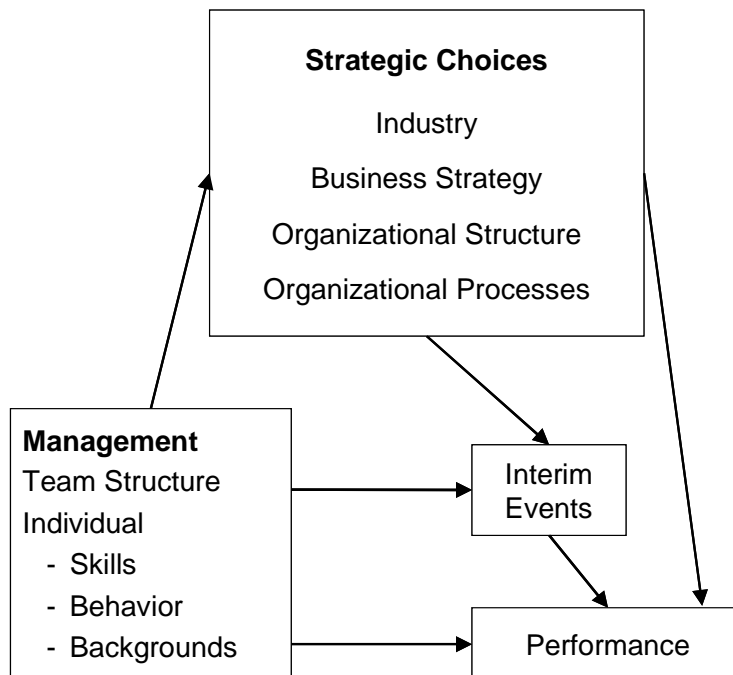
A convenient way to view a new company is shown in Figure 1. The founding management team makes certain strategic choices regarding the choice of industry and business strategy, as well as establishing an organizational structure and a set of processes by which activities are conducted. As indicated by the arrows, these initial choices, as well as the attributes of the management group, will influence later events (such as the time at which the initial product is completed). Together, the interim events, the strategic choices and the management will eventually determine the company's overall performance.

Once the company is underway, the management structure and the "strategic choices" will continue to evolve as the company adjusts its original plan. Although not shown on Figure 1, these choices may be viewed as "feedback" arrows flowing from the interim events to the management.

This study focuses on the subjects in boldface type in Figure 1: the management team's structure, the organization's structure and processes, interim events and performance. We hope to identify how actions at one time cause results later on, and to infer how, if at all, management teams influence performance. The challenge is greater than it may seem because most technology-based ventures, financed by venture capitalists, have relatively little variation in their organization designs and procedures, but nonetheless vary widely in performance.

Figure 1

Influence on Performance



Method

Sample

From 68 technologies-based ventures from which we collected information from business plans (described in Keeley and Roue, 1989), 15 were selected for more detailed study. A stratified random sampling plan gave roughly equal representation across the range of performances, with performance being measured as the composite rate of return to founders, investors and employees over the period from incorporation until the company became public, was acquired, closed, or carried out its last round of funding (if it was still private in early 1989).

The 15 firms were founded between 1978 and 1985. They received an average of \$15 million (with a standard deviation of \$10.5 million) in private equity investments. For the 68 company database, the comparable figures are \$15.9 million and \$11.3 million. The 15 firms yielded an average internal rate of return to shareholders of 56% per year (with a standard deviation of 152% per year). For the 68 company database, the comparable values are 56% per year and 138.6% per year. Seven have become publicly held, three have been acquired (two at a profit), one is still private, and four have closed. Only three out of the 15 have never been profitable.

Eight investments, which returned 31% per year or more on the invested funds, are classified as successes. Seven, which returned 8% per year or less, are classified as losses because they returned less than a risk-free rate of return. The 15 companies represent five industries: computers (5), computer peripheral equipment (5), communication equipment (1), medical equipment (3), and software (1).

Data Collection

An interview with the original CEO is a feasible, uniform method for collecting information about the development of a private company, and all 15 agreed to be interviewed. We intended an unstructured interview to minimize the creation of priming or consistency artifacts (Salancik and Pfeffer, 1977, review the causes of such artifacts). However, the CEOs wanted a more detailed description of the subject. Accordingly, a memo was given to each suggesting that he (all 15 were male) recount the history as he had experienced it and not with the benefit of hindsight. We suggested that he discuss the activities, objectives, major accomplishments and disappointments, main surprises, fundraising, management processes, important changes in personnel, developments in the market or in technology, and the contributions of outsiders.

Each interview was tape recorded and the transcript returned to the CEO for corrections. One of the authors conducted each interview.

The interviewees recalled the sequences of events accurately, but were often unable to set dates for each event. However, from external financing records and other dates which were known, we could generally locate an event within a month or two of its actual occurrence. On the whole, we feel very confident about the accuracy of events.

Analysis

The analysis tests a number of hypothesized connections among team structure, management processes, events and performance. The tests commonly use a 2 x 2 contingency table, and derive a chi square statistic. For example, one axis of the table would be whether or not the company was successful, and the other would be whether it had high management turnover. Occasionally a t test of the difference of means is used.

In many cases there is essentially no variation in the sample (e.g. everyone adopts a functional organization structure); so the test of fit is simply an absence of variation. Implicitly this assumes that the alternative is so unattractive it is never adopted.

Results

Team Structure and Performance

H1: Functional breadth (or team completeness) will promote success. This is NOT SUPPORTED. The rationale for this is found in Roure and Keeley (1990), and it was empirically supported there. However, when tested on a later sample (the 15 companies of this study are a stratified set from those two samples), in Keeley and Roure (1989) it was not supported.

H1': A high functional breadth relative to the scope of the task will promote success. This is SUPPORTED ($t=4.51$ with 13 d.f., $p<0.01$). This requires dividing functional breadth by a measure of the company's "scope". (As explained in Keeley and Roure, 1989, the number and complexity of products are rated from 1 to 5, as are the number of customer groups. The two ratings are averaged.)

H2: A "strong" CEO will increase the chance of success. This is SUPPORTED ($X^2=3.36$, $df=1$, $p<0.06$). Lacking evidence from prior studies, we state this in a direction which conforms to popular belief. To measure CEO strength, we rank the 15 according to the CEO's dominance of the initial formation process (e.g. was there ever a question about who would be president? Who organized the team?) and split the sample at the mid-point. Of those in the egalitarian half, we shift the CEO to "strong" if some early action (such as firing a co-founder) indicates a willingness to act without seeking group consent. On this basis 10 of 15 are "strong."

H3: A CEO with a general management or marketing background (in contrast to one in technical management) will increase the chance of success. This is NOT SUPPORTED ($x^2=1.96$, $df=1$, $p<0.16$).

H4: A young team will have a higher chance of success. Teams were divided into three groups: young (everyone under 35), old (everyone 35 or older) and mixed. This is NOT SUPPORTED ($x^2=4.2$, $df=2$, $p<0.12$).

Managerial Processes Prior to Start-Up

The pre-funding stage lasted an average of 0.70 years (with a standard deviation of 0.39). There was no significant difference between successes (0.74 years) and losers (0.65 years).

H5: Heavy participation by team members in preparation of the business plan will promote success. Hackman (1987) suggests that a feeling of self-control by group members will enhance performance. Helping prepare the plan may create such a feeling of control. This is NOT SUPPORTED ($X^2=0.71$, $df=1$, $p<0.37$).

H6: Participation by someone with marketing expertise will promote success. This is NOT SUPPORTED ($x^2=1.04$, $df=1$, $p<0.30$).

H7: Careful preparation of the initial plan and emphasis on achieving its objectives will promote success. This is SUPPORTED through uniform practice. Every firm prepared carefully and the plan became a centerpiece of its management systems.

H8: A broad initial search for a product idea will promote success. This is NOT SUPPORTED; the searches were almost uniformly narrow. Only one firm conducted a reasonably broad search. The other 14 considered few, if any options. Generally, one of the founders "encountered" the idea while not really searching at all, and then approached the others.

H9: A broad initial search for co-founders will promote success. This is consistent with Hackman's (1987) proposition that group members should have a high level of task relevant skills. This is NOT SUPPORTED; the searches were almost always narrow. Only four of 74 founders were not from the personal networks of the earlier founders, and recruitment of co-founders seldom involved consideration of more than one candidate.

Development Stage: Organizational Processes

The development stage commences with start-up financing and ends with the first product shipment from manufacturing. On average, the period lasted 1.27 years (with a standard deviation of 0.38). The range was 0.75 years to 2.0 years. It was successfully completed by 14 of the 15 companies.

H10: A broad search for the remaining functional leadership positions will promote success. This is SUPPORTED by nearly uniform practice in all cases where evidence is available, and stands in marked contrast to H9. Thirty-one positions were filled with non-founders, and the interviews discussed how 21 of those were located. Nineteen of the 21 were filled with persons not known to the founders and were located via extensive searches.

H11: Early adoption of formal management systems and structures will promote success. Formal systems are consistent with several aspects of Hackman's (1987) model: minimization of coordination losses, access to data, and minimizing slippage. This is SUPPORTED by nearly uniform practice. All 15 moved to a functional organization form quickly (on the average within three months). Of ten who discussed management systems, nine developed them simultaneously with product development. Eight explicitly designed systems which would last for several years of rapid growth.

H12: "Open" communication systems will promote success. As with H11, this is consistent with several aspects of Hackman's (1987) model: self regulation, situation scanning, collective learning and minimizing slippage. This is SUPPORTED through nearly uniform practice. Thirteen of 15 used frequent staff, company and informal meetings for this purpose.

Development Stage: Events

H13: Completing product development on time. Four companies were late (in addition to the one which did not complete development). Two were eventual successes; two were not.

H14: A lack of internal friction among the team members will promote success. This is NOT SUPPORTED ($\chi^2=0.00$ $df=1$, $p<1.00$). Six teams spoke of significant friction. Three succeeded; three did not. The friction related to insufficient effort by a founder in three cases; lack of ability in one; and the wrong "style" in two.

H14': Unresolved friction among the team members will be related to failure. This is NOT SUPPORTED. Of the six, three failed to resolve the problem. Two were losers; one succeeded.

Commercialization Stage: Events

Commercialization extends from the time of product introduction until profitability is attained, or the company is closed for failing to attain profitability. Twelve of 14 succeeded in this stage (though four of those failed to sustain their profitability for more than a year). This stage averaged 1.77 years with a standard deviation of 1.34 and a range of 0.33 to 5.5 years. There is no discussion here of management processes because the interviews contain few comments on them at this stage.

Successful companies will be less likely to face a severe crisis such as falling far below planned sales, experiencing production problems, or design problems. This is NOT SUPPORTED. Ten of 12 whom we asked about crises had a severe crisis including six of eight successes.

H15': Successful companies will be more likely to respond quickly (within three months) to a crisis. This is NOT SUPPORTED ($\chi^2=0.08$ $df=1$, $p<0.80$). Our subjective impression is that only one of the 10 failed to move as quickly as was realistically possible – it eventually succeeded.

H16: Successful companies will have lower turnover of key managers during the development and commercialization stages. This may be viewed as alternative statement of H14. It is stated in this section because turnover was too low in the development stage alone to allow a test.

This is NOT SUPPORTED ($\chi^2=1.46$ $df=1$, $p<0.20$). An alternative test considering turnover among founders and non-founders yields the same result ($\chi^2=4.64$ $df=3$, $p<0.20$); founder and non-founder turnover rates are not significantly different whether in successful or unsuccessful companies.

H17: Competitive pressures less than those forecast in the business plan will be associated with success. This is SUPPORTED. In 7 cases the competition was less than forecast and this was related to success ($\chi^2=5.54$ $df=1$, $p<0.01$). The result is not a surprise, but it helps confirm that some interim events will influence success.

Discussion

At this point, the breadth of the team and the CEO's strength relate to success, but no interim result has been identified to explain why. The similarity of successful and unsuccessful companies in this analysis verifies our impressions from the interviews that every company did an impressive job of carrying out its plan.

By including crises one year beyond the achievement of profitability, we find that three seeming successes met a major reversal, making a total of fourteen crises (one failure to complete development, 10 during commercialization, three in the year following). These exhibit a pattern: six of seven product crises (slow acceptance or rapid emergence of overwhelming competition) resulted in a losing investment, and six of seven technical or manufacturing crises ended with success ($\chi^2=7.14$ $df=1$, $p<0.01$).

The avoidance of a product crisis is in turn weakly related to the breadth of the founding team in H1' ($t=1.94$, $df=13$, $p<0.08$) and strongly related to CEO strength as defined in H2 ($\chi^2=6.54$ $df=1$, $p<0.01$). Thus the initial management team apparently influences success either through the initial selection of a product, or conceivably through ability to solve the crisis.

To test the latter possibility we classify the crisis responses (all 14 responded) as major or minor, and then analyze the circumstances which led to a given response and the result. This suggests the teams' attributes did not influence the type of response. Strong CEOs are equally likely to make a major or minor response. Major responses are associated with broad teams, but not to a significant extent ($t=1.41$, $df=12$, $p<0.20$). Additionally, major and minor responses are equally likely for either type of crisis, and the chance of success is equally likely whether the response is major or minor.

From this we tentatively conclude that a founding team's greatest influence on success is through the initial selection of a product. Once that choice is made, the firms in our sample performed roughly equally in organizing and carrying out their missions.

Considering the process for selecting products (H8) and founders (H9), our conclusion appears surprising, because there is no evidence of a thorough search. However, the selection process makes sense if one makes two assumptions: 1) good ideas are rare—so rare that a systematic search is unlikely to pay off; 2) an experienced person in a given industry can recognize a good idea, if by slim chance it is "encountered." That person screens the idea by approaching a few potential co-founders, who essentially vote "yes" if they choose to join the venture. From the apparent rarity of potential founders who chose not to join, we suspect that one or two knowledgeable "no" votes will cause the discoverer to abandon the idea. A broader team

implies more "yes" votes and this reduces the chance of an erroneous estimate of the venture's merit. Similarly, a strong CEO can help assure that the review with potential co-founders is thorough, which should also reduce the chance of an error.

On the whole these results probably support organizational ecologists (e.g. Hannan and Freeman, 1989). The ability of firms to adapt appears strongly constrained. The process by which they find products is not systematic. And almost every team that receives funding carries out its mission in a similar and efficient manner. The question is whether they have located the right niche and embarked on the right mission.

These results also show the merits of the venture capital system. It provides a means for screening ideas which occur in many random ways, and for assuring that companies follow the best known organizational practices. Two avenues for improvement may be to avoid funding efforts to adapt when the initial product is not doing well, and to put more resources into the initial product evaluation.

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