Obstacles To Growth
Of New Technology-Based Enterprises

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Abstract

Most new businesses based on new technology start small and stay small. The lack of growth of these businesses limits the diffusion throughout society of the benefits of new technology, and incurs opportunity losses for inventors, investors, potential employees and other stakeholders. The small percentage of new businesses that exhibit dramatic growth account for almost all of the wealth created by new businesses. If newly formed businesses based on new technology could be encouraged to grow, significant social and economic benefits could result. In order to gain these benefits, we need first to identify barriers that impede growth, so that we might find ways to over come those obstacles. Examination of cases and interviews with more than 100 entrepreneurs and those who financed new technology-based ventures revealed seven principal obstacles to growth: (1) lack of vision for the business, (2) objectives and risk preferences of startup teams, (3) difficulty of identifying a "right" size for the business, (4) inappropriate timing of growth, (5) trying to grow too quickly or too slowly, (6) inappropriate product-market choices for growth, and (7) inability to assemble and deploy intellectual , human and financial resources effectively. Data suggested ways that each obstacle might be overcome, and implied both action guidelines for those involved in new technology-based businesses and direction for researchers.

Introduction

Most new businesses based on new technology start small and stay small (Reynolds and West 1988). The one to two percent of new businesses that exhibit dramatic growth account for almost all of the wealth created by new businesses (Birch 1997). Other studies indicate that fewer than 10 percent of all new businesses sustain double-digit growth for more than five years. At the end of the period most of the businesses have fewer than 10 employees and annual sales under a million dollars (Cardozo et al 1991).

The lack of growth of the other 90 to 98+ percent of businesses limits the diffusion throughout society of the benefits of new technology, and incurs opportunity losses for inventors, investors, potential employees and other stakeholders. To be sure, not all of these new businesses – whether technology-driven or not – have the potential to grow in a manner that will create value for their stakeholders. But it is difficult to believe that no businesses capable of substantial growth remain in that 90 to 98+ percent.

If there are new technology-driven businesses that have the potential to grow but have not significantly exploited that potential, then there must be some obstacles or barriers to growth. If

there were no such impediments, then businesses with the capabilities to grow would achieve their potentials. Put another way, the existence of impediments to growth that did indeed thwart growth would tell us that there were, indeed, new businesses with potential to grow that did not grow.

Identification of those impediments would enable us in subsequent research to estimate the number of firms in which growth had been hindered (i.e., potential unrealized), and the extent to which growth had been impaired. Even without the detailed information that subsequent research might yield, identification of impediments to growth would enable those involved with new technology-driven businesses to anticipate, and to develop strategies for coping with, obstacles to growth.

Thus the purpose of the present study is to identify barriers to growth that may operate within technology-driven firms. The longer-range goal is to build a body of knowledge about obstacles to growth, which knowledge would help stakeholders in new businesses to cope more effectively with those obstacles.

Method

A three-stage research strategy was designed to pursue this long-range objective. At the present time the first stage has been completed, and the results reported in this paper.

The first stage involved assembling available knowledge about obstacles to growth, through review of published materials and of archival materials in the Center for Entrepreneurial Studies at the University of Minnesota. The almost total lack of articles dealing with the topic in scholarly publications prompted a review of newspapers and magazines. Useful data from those sources proved elusive, in part because definitions lacked clarity; in part because information came from individuals removed from the businesses themselves; and in part because starting small and not subsequently growing does not constitute "news."

Archival materials consisted of interview data gathered over more than a decade from entrepreneurs, senior executives and investors in technology-driven startup firms; together with, in many instances, interviewers' analyses of the data. Some of the firms had enjoyed significant growth; others had not. "Technology-driven" was broadly defined to include patented products and processes, as well as proprietary knowledge.

These interviews had been conducted by different interviewers for a variety of purposes. The inclusion of a variety of informants, different interviewers and a long time period would be likely to yield a data set high in variation. In other words, this archival method should cast a wide net for information about obstacles to growth.

This approach, then, is likely to yield a data set that includes virtually all the phenomena of interest. Thus this approach is well-suited to *identifying* such phenomena. To the extent that interviewers recorded respondents' comments on barriers to growth, the data set should contain rich descriptive material about the obstacles and the manner in which they hindered growth. While this approach is appropriate for a *qualitative* study, it is not well-suited to a *quantitative*

study, either for counting the incidence of occurrence of phenomena or for testing hypotheses about those phenomena.

The second stage of research rests on the assumption that the first stage has identified most – but not necessarily all – the barriers to growth, and has begun to describe their operation and importance. The second stage itself will consist of a structured interview intended to define more precisely the obstacles to growth and to elicit from respondents descriptions of how particular barriers act to impede growth. This second stage should provide a basis for generating hypotheses about the operation and impact of particular barriers under specified circumstances.

The third stage in the research plan will involve evaluation of hypotheses generated in the second stage. Output from the third stage will include not only data that may be generalized to a broader range of firms and situations, but also additional hypotheses for subsequent evaluation.

In the context of a three-stage research strategy, then, this first stage whose results are reported here represents largely an exploratory activity. Data analysis for this exploratory stage consisted of grouping the barriers mentioned into categories suggested by prior collection of anecdotal evidence (Cardozo 1992), then revising the classification scheme to form categories that appeared to be collectively exhaustive and mutually exclusive.

Results

This classification of barriers indicated that new technology-based ventures face seven principal obstacles to growth: (1) lack of vision for the business, (2) objectives and risk preferences of startup teams, (3) difficulty of identifying a "right" size for the business, (4) inappropriate timing of growth, (5) trying to grow too quickly or too slowly, (6) inappropriate product-market choices for growth, and (7) inability to assemble and deploy intellectual, human and financial resources effectively.

Lack of *Business* Vision

A principal barrier to growth appears to be the lack of a clear definition of the opportunity the business is intended to exploit. This problem appears to lie not with measurement of magnitude of opportunity (market size and/or likely share), but simply with definition of what the opportunity is. Even if the opportunity is crisply defined, the lack of a clearly defined value proposition (what value the new business will create and for whom; why/how this value is superior to what's on the market now; and how the business will sustain that superiority) acts to limit growth because the entrepreneur(s) cannot communicate their concept to others in an effective and efficient manner. As a result, individuals operate with different sets of beliefs, expectations, agendas and objectives, rather than working together for a common goal.

Founders of many technology-based startups appear to think in terms of a technology or a product, rather than in terms of a business organized to create and deliver value. This "technical" focus may operate by itself to limit sales to a relatively small number of technically-oriented individuals or firms to whose needs the founders can relate. This focus may appear as

an emphasis on product features instead of customer benefits and value sought; on professional colleagues instead of end-users and intermediary buyers and sellers.

Founders may see only immediate challenges, rather than looking into the future to recognize subsequent challenges and stages of growth. Those whose energies are concentrated wholly on getting "version 1.0" into production and available to customers may be less likely to grow their businesses than those founders who plan from the outset for versions 2.0 and beyond, as well as for expansion of customer base and firm infrastructure.

Many founders appear to have no concept of what their businesses might become, or in what direction they might proceed once the business has begun. Without such concepts, or with concepts that change frequently, the business may wander and be unable to grow successfully in any direction because it's pulled in many directions. One of the symptoms of lack of growth because of lack of direction may be a firm's accepting (and even chasing) any order it can get, simply to keep production levels up, rather than determining which orders it can profitably accept and which it cannot.

At the other end of the continuum from the goal-less firms lie the startups whose business visions, and the "road maps" for how to actualize those visions, are fixed and not susceptible to change. These latter firms may have equal difficulty in growing, because senior decision-makers consider themselves bound by detailed forecasts and plans. If goals are fixed, then flexibility in routes to achieve those goals may be necessary for growth. In addition, goals themselves may have to be changed once the neophyte firm has encountered the realities of the marketplace.

Objectives and Risk Preferences

Differences among founders with respect to objectives, and risks to be accepted in moving towards those objectives, may account in part for unclear, shifting or multiple visions for an emerging business. Most new firms with 10 or more employees are begun by an entrepreneurial team, or set of founders; it may be unrealistic to expect that all members of a founding team share the same objectives and willingness to accept risks, or to expect that their objectives and risk preferences will remain unchanged over time.

Even among single-founder businesses, or firms in which startup team members share similar objectives and risk preferences, most have objectives other than wealth creation. Founders' interests in lifestyles rather than wealth, simply demonstrating the commercial viability of their ideas, or preserving wealth already accumulated – all these discourage growth.

Even those founders motivated to grow their businesses may fear "risk" as an unknown, albeit sinister, force. Such individuals appear unlikely to take actions to increase the size or scope of their businesses. They are concerned with incurring a loss, rather than with missing an opportunity for gain. In contrast, founders who can identify as "risk factors" particular processes or events that might affect cashflow, and can develop contingency plans for dealing with those processes or events, may be more willing to invest in growth.

How Much to Grow

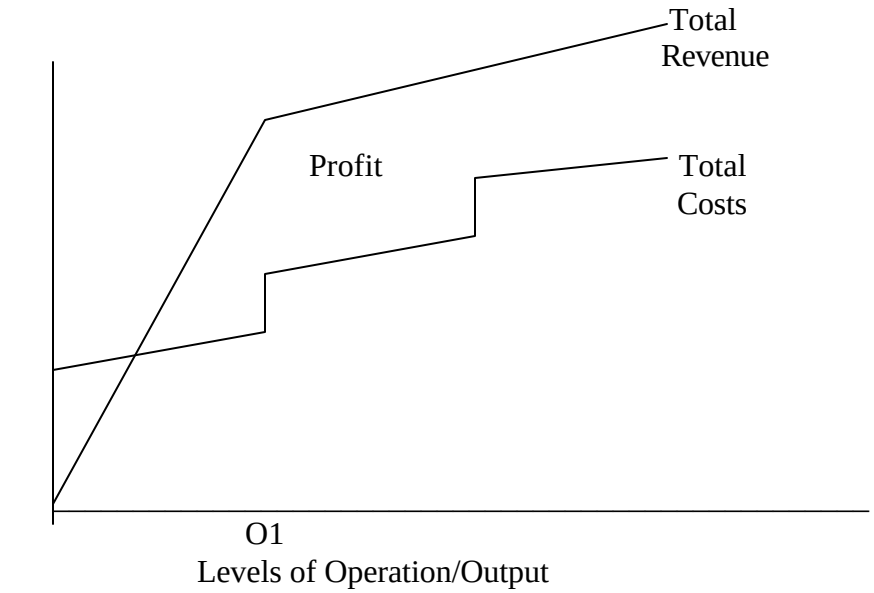
Some technology-based businesses have experienced growth in sales without growth in profits, or have incurred losses from expanded operations. Such experiences appear to cause those in charge to rein in plans for further expansion.

The problem of unprofitable growth appears to result from operating at suboptimal levels, and may occur most frequently when emerging businesses make major commitments such as new facilities, major personnel additions, and the like. Until and unless the new commitments lead to adequate revenues, unprofitable expansion will result.

This problem arises in large part because investments and costs, on the one hand, and revenues, on the other, do not move exactly in parallel with one another (see Figure 1, below). Generally speaking, the most profitable levels of operation – the greatest surplus of revenues over costs – occur just before major expenditures are needed to expand to the next level of operation. In Figure 1, level O1 represents the optimum level of operation to maximize profits (revenues minus costs). Growth to higher volumes yields lower profits, if the forecasts of costs and revenues are reasonably accurate.

Some firms calculate a "breakeven point" for major new expenditures, and then make those expenditures if they believe that additional revenues will exceed additional costs. Such calculations avoid out-of-pocket losses on the new expenditures themselves, but do not address levels of profitability, which may well be lowered until the new facility, infrastructure addition or other expenditure brings in substantial additional revenue.

Figure 1: Revenues, Costs and Optimum Levels of Operation



In sum, use of breakeven calculations, instead of forecasts of full costs and revenues, may produce short-term losses that discourage decision-makers from pursuing additional growth.

Timing: When to Grow

Some firms may not expand because they've entered their markets at a time when growth may be very costly. Firms that enter technology-driven industries when those industries are maturing typically find it difficult to exploit more than a niche market, unless the new entrant offers a significantly superior value that appeals to a large portion of the market, and that existing competitors cannot copy.

In contrast, firms with a sustainable advantage that enter an industry in its "take off" or "growth" stage, are likely to grow if they simply allow themselves to be carried along by market momentum.

Early entrants often must incur substantial costs to convince customers that a new technology is indeed superior. Early entrants that can continue to attract resources are likely to grow as the technology is accepted; early entrants whose principals and resources are exhausted from the tasks of pioneering appear unlikely to grow.

How Fast to Grow

Several factors appear to affect the rate of growth. (As the rate approaches zero, one would say that these factors operated to stifle growth altogether.) Barriers or limits to the *speed* of growth include customers, channels, constraints, cash and controls.

Customers (end-users) generally need some time to adapt their thinking to a new technology. If a new technology requires customers to make capital expenditures, the customers' budgeting and purchasing cycles limit the rate at which the new technology may be sold. If a new technology, product or process requires the customer to incur switching costs (e.g., modifying a production line to integrate advanced robotics), customer acceptance will likely take longer than senior managers of emerging firms might expect.

Channels, or intermediaries between the technology-based startup and the end-user, may behave in a manner similar to that of end-users. Resellers or equipment manufacturers that are integrating a new technical component into their end-product may need time to dispose of existing inventories from previous suppliers.

Constraints include regulation and public policy concerns. Regulatory approvals may be slow in coming forth from government agencies. Even approvals like Underwriters Laboratories may add months to the expansion plans of a new business. Licenses and related approvals may also stretch out growth cycles for new firms. Of course, failure to obtain needed regulatory approvals and licenses may halt not only growth but the entire operation.

Lack of cash can choke off expansion very quickly. Without ability to pay taxes, employees and suppliers, businesses cannot grow, and may be unable to sustain themselves at

all. Cash may be in short supply because a firm's expansion has outstripped even its most careful plans, and sources of finance – even if already committed to funding expansion – may take some time to deliver funds. What appears more likely, however, to cause shortages of cash is lack of cashflow planning. This lack may come about because entrepreneurs have used for their planning typical accounting statements (profit-and-loss statements and balance sheets) and forecasts instead of cashflow statements and forecasts. In some instances, cash shortfalls occur because no forecasting or planning has been done at all.

Control systems can also limit growth when new businesses outgrow them. A business that literally goes "out of control" almost always experiences serious problems with customer service and incurs higher costs of operation. Customer service problems slow the pace of reorders from existing customers and produce unfavorable word-of-mouth, thus delaying or blocking sales to new customers. Higher costs result in part from lack of cost controls over operations, and in part from loss of financial controls. The latter generally leads to higher interest costs from both bankers and suppliers.

Capacity influences both maximum and minimum rates of growth. Capacity, meaning the capability of all resources to create and deliver value, can cap a firm's rate of growth; there is a limit to how much production even the most ingenious can extract from a finite facility. But capacity can also dictate lower limits of a firm's growth. A facility with excess capacity incurs higher overhead costs per unit. Senior managers capable of running $100 million operations will not remain long at $10 million businesses.

Competition affects minimum rates of growth. Firms entering highly competitive markets ordinarily must achieve certain minimum market shares to remain viable competitors. In an industry in which major players must command multi-million dollar levels of sales and/or market capitalization (e.g., internet businesses), prompt growth to a viable "adult" size may be essential for survival of the fledgling firm.

Product-Market Choices

Two managerial errors appear to constitute the major barriers to growth in the product-market domain. The first appears as a disorderly "take-any-order" pattern of behavior, in which emerging technical businesses modify products (sometimes extensively) for a single user, but make no attempt to pursue the market which that modified product might represent. Product modification aside, some fledgling firms lack market focus to such an extent that they will accept any order without regard to its cost in terms of market development and service time. This lack of targeted marketing effort appears to place emerging businesses at the whim of chance – that some products will catch on with customers who represent substantial potential, and that someone in the startup company will recognize the opportunity and pursue it.

The second error involves concentration on product line extension and product line development at the expense of market expansion. This phenomenon differs from the first because this second error appears to result from deliberate planning rather than a hectic scramble for revenue. Even if investment in product development turns out to be successful, growth of the business will have been delayed or the rate of growth reduced. It appears more likely that not all

product development efforts will garner market approval, because those efforts will have incorporated little, if any, information from the market.

A third obstacle to growth may be related to the second error. This third obstacle is an unwillingness to change the product or line in response to customers' criticisms and suggestions, and a "blindness" to applications that may be attractive to customers but were not foreseen by company founders.

Resource Assembly and Deployment

Three obstacles to growth appear in this category: (1) inability to attract funds, (2) inability to attract people and (3) failure to develop an infrastructure to sustain growth. Difficulty in attracting dollars may arise from any one or a combination of four factors. First, the entrepreneur(s) may be unable to articulate their plans for expansion and their consequent need for money. Second, they may be approaching inappropriate sources for funding, e.g., banks to fund research and development, which typically calls for equity financing, or venture investors for working capital supplements that will be required for a relatively short period. Third, even if they have met appropriate sources, the entrepreneur(s) may not be tailoring the deals they seek to make to the objectives and risk preferences of the prospective funders. Finally, founders may be reluctant to give up a high percentage of equity in a small company for a smaller percentage of equity in a much larger company, even though the latter is likely to yield far more dollars.

Difficulty in attracting key personnel occurs when founders are insufficiently networked to identify appropriate key people. Even if appropriate candidates for key positions are identified, founders may be unable to articulate their vision of the company in a manner that excites prospective hires, or be reluctant to pay (in salary and stock and/or options) what is necessary to attract top people. Founders who insist on control of all aspects of their operations, or who cannot make the transition from managing operations themselves to overseeing others who manage operations, appear unlikely to attract key individuals needed if a business is to grow.

Entrepreneurs who fail to recognize the need for an infrastructure to sustain the business and enable it to grow place an obstacle in the way of growth. Founders who recognize the importance of building infrastructure but postpone investments in infrastructure delay and/or reduce the rate of growth of their companies.

Discussion

Identification of numerous barriers to growth lends credence to the idea that there are, indeed, new technology-driven companies that have the potential to grow but do not do so. Reflection on the nature of these barriers suggests that some obstacles are likely to be sufficient to prevent or limit growth, while it may be possible to overcome other obstacles.

The barriers of *vision* and *objectives and risk preferences* may block growth altogether, because those obstacles appear to be inherent in the entrepreneurs themselves. If founders of technology-based businesses are willing to accept counsel, then may of the *vision* barriers may

be overcome. Often those involved in financing a new business can help inventors and founders to develop and articulate a vision for the business, and can provide planning skills. On the other hand, *objectives and risk preferences* appear to be deeply imbedded within individuals and unlikely to be changed.

All the other barriers – *size, timing, rate of growth; product-market choices; assembly and deployment of resources* – represent challenges that investors, other stakeholders or outside analysts can help the entrepreneurs address. With these issues a little assistance can go a long way. Simply identifying the barriers that confront a particular business, and showing entrepreneurs basic techniques for planning and analysis, would likely go a long way towards helping entrepreneurs in new technology-driven businesses to remove many of the obstacles to growth.

Conclusion

This exploratory study has identified several barriers to growth. Work in the second stage of research may expand the list, and shed additional light on how particular barriers operate to hinder growth. Analysis of data from that second stage may well result in formation of different categories, or even a different classification system, to describe obstacles.

The present exploration has also yielded information on how some barriers come to be, and the reasons for their appearance. In addition, there is a limited amount of data on differences between firms that have grown and those that have not. These topics should be pursued during the structured interviews in the second stage.

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