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FAILURE OF HIGH TECHNOLOGY FIRMS: A STUDY FROM NEAR-DEATH EXPERIENCES

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ABSTRACT

Studies have identified many factors that influence the successful initiation (or birth) of a firm such as level of innovation, entrepreneurial commitment and financing. Researchers have also found that the factors that lead to the failure (or death) of a firm can be just as varied. High tech companies deal with additional life-critical factors such as timely commercialization, market acceptance and technology lifespan. The author recounts near-death experiences of four high tech companies and compares their factors with those found to be significant by other authors in failures of general businesses.

EXECUTIVE SUMMARY

The study of failure (or death) in high technology businesses has been lightly represented in the literature compared to the study of the factors of entrepreneurship and venture formation in such businesses. Certainly there are factors such as market timing, financing, management ability and focus, technology maturation, product development processes, market and sales strategy that influence the success and or failure of firms that attempt to commercialize technology in areas of high R&D investment such as Silicon Valley and Route 128 in Massachusetts. Post mortems of high tech businesses have led researchers to offer conclusions about factors that led to the cessation of a firm based on interviews or surveys of the firm's former employees. In this paper we offer a modest study of near-death experiences that may also shed light on the factors that can cause death of ventures in high technology. The author recounts near-death experiences of four different companies all in high technology – one in Route 128, one in Silicon Valley and two in the US South. These brief case studies lend themselves to observation control and level calibration since the same observer is used to compare the management scenarios and financial data. Near-death experiences can also be labeled "turnarounds" since the firm survived whatever crisis brought about the almost fatal event. The near-death scenario also yields strategic alternatives that a firm has at its disposal for survival. Some of these alternatives are generic, others specific to the high tech industry. Having selected the specific alternative to survive may provide valuable information to the entrepreneurial team that desires to learn from the experiences of others.

DEFINITION OF THE FAILURE OF BUSINESS

The failure (or death) of a business can result in one or more "modes" or outcomes – dissolution, liquidation, bankruptcy, or even unplanned acquisition. Any one of these outcomes is equated to *firm failure*. All these outcomes are actually unplanned to a

degree since most, if not all, businesses have every intention of being successful and making lots of money for their investors for an indefinite period of time. Failure of a business inevitably brings about one or more undesirable effects – personnel layoffs or involuntary terminations, non-payment or delays of payment of debts, legal actions against the firm, hardship for customers requesting products or services (or in the worst case, loss of customers), predatory practices by competitors, poor management experience for executives, asset seizures by secured creditors, eviction notices by landlords and irate investors and shareholders. Hence, the number of and the enormously negative effects of business failure provide motivation for managers to avoid such a calamity.

What usually brings about business death is the stage of insolvency or the threat of insolvency, defined in the accounting sense – the inability to pay actual, anticipated or perceived debts in a timely manner given the value of immediately liquid assets plus the value of any other assets that can be transformed into liquid assets in a short time frame, usually 90 days or less. The book value shown on a company's balance sheet may not be a good indicator of a company's solvency for several reasons. First, the balance sheet may have overvalued assets, especially those that would not transform themselves into a cash value anywhere near their stated value under adverse conditions. Second, liabilities on the balance sheet may not be shown relative to aging. Supplier debts, for example, that are aged beyond 90 days may be cause for imminent legal action against the firm. Finally, if the balance sheet has not been audited by an outside reputable firm, there may be other inaccuracies that totally distort the true financial picture of the firm. An early paper on this subject by Richardson (1914) warns business owners of the "importance of right bookkeeping and accounting methods."

Insolvency in a company by itself will not cause failure. It is only the action of key stakeholders upon learning a company is insolvent that will cause death. For example, a key supplier may be owed a substantial amount of money but if the supplier chooses not to curtail or even stop material shipments to the debtor firm, the debt will only grow until action is taken. In the same way, bank loan covenants may be violated by the client company but if the bank does not take action, the company can continue its business unmolested.

It is important to keep in mind that actions against the company are necessary in order to drive it towards a failure mode. Insolvency is simply a precursor stage. In general, several actions must be taken to drive the company to failure or death. In some states, several unsecured debtors must join in a legal action to drive the company to a partial or total liquidation in order to pay off the debts. A secured creditor, such as bank or term loan holder, has more power since it is (normally) already singly and unilaterally entitled to legal seizure of assets upon proper notice to the company of its default of payment.

NEAR-DEATH EXPERIENCE AND "TURNAROUND"

A "near-death" experience is the process by which a company reaches an insolvent stage and manages to evade business failure and resume normal or regular operations. The

near-death experience defined here is associated with the *non-use* of bankruptcy or other legal procedures that may be available for keeping creditors at bay until the company recovers from the state of insolvency. (In such legal maneuverings, the firm that emerges rarely has the same structure of governance so we do not include such cases.) Hence, all the factors that may drive a company to insolvency are the same for the company that experiences "death" as they are for the company that survives the stage of insolvency. The conclusion from this argument is that the study of factors that lead a company to near-death is valid also for the study of factors that lead a company to death. The importance of accepting this conclusion is two-fold. First, trying to figure out what led a company to death on a post mortem basis is difficult due to the scant data left when employees disappear and important information may have left with them concerning the last weeks or days before death. (This problem is alluded to in the Bruno et al article, "Why Firms Fail" (2001). The authors cite four research difficulties, sampling, reticence of founders to discuss failure, inability of founders to understand and articulate cessation and the multidimensional complexity of the problem.) Second, a company failure is not a happy event and those that are willing to talk about it may find reason to excuse themselves from detailed inquiries, or worse, blame the failure on irrelevant events or decisions. In contrast, near-death is a happier event, perhaps even worth celebrating akin to a person ecstatic that he or she is still alive after a near-death incident. Certainly more data is available since servers are running so a wealth of traceable events in electronic ledgers and ERP systems is available to the researcher.

A company that resumes normal operations after entering the stage of insolvency is said to have experienced a "turnaround." While "turnaround" is generally used in a broader context in the business language especially with regard to the profitability of public companies, we will confine our usage to a company's successful emergence from insolvency. The turnaround is achieved through several general steps basically involving cash generation and preservation:

- Identify salvageable revenue streams and customers and protect them; look for advance payments for future product or service deliveries;
- Minimize cash outlay and allocate payments to suppliers and creditors on a priority basis;
- Determine personnel requirements and make staff level adjustments immediately;
- Start negotiations with the bank or other asset-based creditors for extended terms;
- Determine cash requirements for future operations and begin allowable asset-to-cash conversions and a search for new cash-for-equity investments.

There are many other "soft" initiatives necessary to execute a company turnaround, a short list of which follows:

- Assemble remaining personnel and fully inform them of the plan for the turnaround and elicit their cooperation and support. Continue regular employee meetings with the main agenda item being a progress report on the plan's execution.

- Meet with all “critical” customers and address any fears of product or service stoppages.
- Meet with all “critical” suppliers and establish communication lines to address any concerns.

FOUR SHORT CASE STUDIES OF NEAR-DEATH BUSINESS EXPERIENCES IN HIGH TECH COMPANIES

The following are four brief case studies of high tech companies in which the author was an officer in some capacity and was privy to knowledge about the financials and operations of the four companies before and after the near-death experience of each company. First, we present the “before” scenario and then we will summarize the “after” set of events with a recap of the methodology used to escape business failure. A table will be used to summarize the factors that led to the near-death experiences and compare the factors with those expounded by other authors in the literature.

Case I. Boston Area Route 128 company. (Equipment supplier to banks, brokerage houses, Fortune 500 companies).

The company had accepted an $8 million investment from a venture capital syndicate for the purpose of expanding sales and marketing. Revenue had been steadily growing and had hit nearly $30 million at break even when the investment was made. The company hired a new management team to replace and/or supplement management held over from the company’s start-up phase. The engineering workforce was augmented in order to start new product developments. After a year of having the new management in place, the revenue did grow significantly but expenses and product costs grew even faster and the company remained at break even. In the second year, revenue dropped precipitously and losses ensued. Soon, the bank holding the asset based line visited the company and informed it was being put in a “work out” group. The signal was given to the new investors, who now controlled the board of directors, that the company was basically insolvent if the bank “called” the asset-based line.

Case II. Silicon Valley company. (Test equipment supplier to varied industries)

The company was a subsidiary of a public holding company contributing about 20% of the aggregate revenue. The subsidiary provided an income statement and balance sheet monthly to the holding company and relied on meeting its cash requirements by borrowing against receivables sent to its parent. The parent held an asset-based bank credit line on behalf of all its subsidiaries. The CFO of the parent company observed several months of normal cash withdrawals by the subsidiary against fewer but larger receivables. When the CFO asked for details of the large receivables, the subsidiary was reluctant and slow to deliver the details. After a visit to the subsidiary by auditors from the parent company it was evident that one large receivable was based on nothing more than a shipment to a wholesaler who agreed to the shipment in exchange for extended credit terms undisclosed to the parent company or the bank. Several other receivables were found to be questionable. After a revaluation of inventory and a restatement of the

YTD balance sheet and income statement it was determined that the subsidiary was insolvent.

Case III. Company in Southern US (Microwave and communications equipment supplier)

The company had enjoyed a nearly $10 million infusion of capital from an equity offering. The company paid off outstanding loans and used the remaining $6 million for investing in a new microwave radio product line development and expanding its international marketing channels. Although the company had been successful in marketing an OEM microwave radio product line, it had never developed one. Further, the international channel had not achieved profitability. Several new engineers were hired and some of the development was contracted out to a microwave design house. After two years the company had about $2 million left of the new capital left since the balance had gone to fund the losses resulting from the heavy investment in new product design and international market expansion. Six months later, the company experienced field problems with its new microwave radio product and international sales were growing but the channel remained unprofitable. The company's audit firm wrote down obsolete inventory and registered a negative $6 million book value of the year-end balance sheet and declared the company insolvent.

IV. Company in the Southern US (Equipment Supplier to Wireless Network companies)

The company had been limping along with flat sales at nearly break even with a zero book value on its balance sheet. It had two major customers who were experiencing satisfaction with the company's product lines. However, the contract manufacturer of its equipment placed the company on "ship-hold" sporadically thus crimping shipments to customers. The company's bank had restrictions on asset usage to protect its loan. Cash was tight and suppliers had already been extended to 90 days. Sales morale was flagging since commissions had not been paid for two months. The company entered an insolvent stage at calendar year end.

AVOIDING FAILURE

Managing a company often means managing "up" as well as "down" indicating to some degree that revenue and profitability cycles are inevitable. Some managers are sometimes labeled as excellent in managing in one direction or the other but few earn the label of being able to manage well in both directions. The attempt at growth of a company is a treacherous road and can often lead to the opposite result - decline in sales and/or profitability. In the four case studies briefly summarized above we note in the following table the top four factors that led to the near-death experience and the major actions taken to escape failure. Last we compare the factors to those listed in prior publications to see if high tech companies give rise to new factors. We admit there is some subjectivity to the choice of the top four factors but in each case the same person is making the priority call so we claim that there is some consistency. The entry "deus ex machina" refers to the

belief that a miraculous event will bring about a solution to the company's problems. In Case IV such an event could be argued did indeed occur. An investor did show up suddenly and made an equity investment at a critical time.

Table 1
Summary of Factors in Case Studies That Led to Near-Death

Company	**Factors**	**Actions to Avoid Death**
Case I: Route 128	1. Management inexperienced in market;	Cut Expenses Severely;
	2. Expenses incurred in advance of adequate revenue growth to achieve profitability;	Renegotiate Bank line; Suspend payments to non-critical creditors;
	3. Expense cuts delayed too long;	Accelerate new product lines;
	4. Growth expectations unrealistic given no new product line;	Long term customers protected;
Case II: Silicon Valley	1. Fraudulent Receivables Created;	Replace Management
	2. No Appeal for Assistance from Parent;	Cut Expenses severely
	3.Expense cuts delayed too long;	Accelerate new product lines;
	4.Unrealistic expectations for "deus ex machina"	
Case III: South Co. 1	1. Company inexperienced in microwave product development; (late delivery)	Cut Expenses severely
	2. International market expansion an excessive drain on cash;	Renegotiate agreements with bank and suppliers;
	3. Expense cuts delayed too long;	Cut back on product feature sets and fix field problems;
	4. Unrealistic expectations for new product success & revenue;	
Case IV: South Co. 2	1. Company bleeding to death with no plan to avoid death;	Major investor infuses $1 million cash into company for equity and control.
	2. Unrealistic expectations for "deus ex machina"	Major customer pays in advance for product shipments in return for price discounts;
	3. Inadequate expense cuts to reach profitability;	Bank line renegotiated
	4. Market retrenchment strategy failure	

A COMPARISON WITH PUBLISHED FACTORS

A review of the number one factor in the four cases leads to the conclusion that managerial errors in either integrity or strategy or the lack of experience coincides with findings in a number of publications. Birley and Nikitari (1996) cite managerial inflexibility or autocratic nature as an important factor in business failure. Eighty percent of all business failures can be attributed to managerial issues. Sheldon (1994) concluded that "internal factors requiring administrative action" was an important factor in business failure. In Jusko (2003) "leadership mistakes" was offered as an important factor leading to business failure. From a major auditing firm – Coopers and Lybrand – its newsletter in 1973 cited a Bank of America study that indicated "managerial incompetence or inexperience" as causing 90 percent of business failure. Although Gaskill et al (1993) conducted a study of the apparel and accessory companies, an area removed from the high tech industry, that study also concluded that "poor management skills" or "poor managerial functions" accounted for a major factor in business failures. Finally, Hayward (2001) indicates that poor management is the cause of one half of all UK bankruptcies. Schiffman (1998) notes that 80% of new businesses fail in the first two years and that salesmanship is a major factor for success.

Returning to our table summarizing the major factors of the four brief case studies, "delay in expense cuts" and unrealistic expectations for "deus ex machina" were errors of judgment. In one particular article by Osborne (1993) an argument is made that "the horse is often more important than its rider in determining entrepreneurial success. The comment gives credence to the nature of the business and its environment as being a more important factor in determining failure or success. This is in contrast to the theme of Swiercz and Lydon (2002) of the "critical factor in the long-term success of a new venture is the personal leadership ability of the entrepreneurial CEO."

A review of pertinent literature also reveals that the process of expansion or diversification places a high tech firm in a "high risk" situation. This factor is found in the lists for South Co. No. 1 and No. 2. Sommers and Koc (1987) argue that a high tech company undergoes stress in every aspect of the organization when there is a high rate of change as in expansion or diversification. This may explain Lewis' (2002) data that indicates incubation services assist in the survival of young companies undergoing growth.

CONCLUSION

Through the analysis of four brief case studies it has been shown that there is indeed a correspondence between the factors that are associated with business failure and those that lead to insolvency, a state that precedes business failure or in some cases a business turnaround. What is important to note is that the study of business failure can be studied under a more information rich environment if an effort is made to examine the factors that lead to insolvency instead. An extension of the work here could involve examining a much larger data base of companies that have undergone a near-death experience and

tabulating the major factors that led to each company's crisis and then comparing those to the ones cited in the literature that lead to business failure.

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