How Businesses Fail in Managing Technology: A Review of the Literature

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Abstract – **Improper technology management will cause business failure. Based on literature review, this paper examines some of the main reasons why companies fail in managing technology. The paper identifies and explains seven principal reasons which may cause a tech company to fail: Leadership, Strategy, Marketing, Timing, Finance, Operations, and Communications. Measures are suggested to prevent and predict these failures based on lessons learned as well as ideas and options for success. We analyze not only what happens in those failures but also the interdependencies of these failures. Business failure can always be traced to poor management of technology and improper innovation. Our work can help technology companies to avoid future failures or at least create some sort of awareness on common mistakes that are currently happening in businesses so that these can be dealt with on time.**

I. INTRODUCTION

Successful technology businesses garner much attention in the press and in business journals. Yet failure caused by some aspect related to technology management happens more frequently than it should. Some researchers [1] [2] [3] [4] [5] discussed about reasons causing business failures, but they didn't thoroughly analyzed those root causes. Peter Manning [1] says that the three reasons why firms get into trouble are management, management, and management. In this survey of the subject, based on our literature review, we examine some of the main reasons why companies fail in technology innovation. In order to find out the reasons which cause failures, we need to fully understand not only what happens in those failures but also the interdependencies of these failures. Most importantly, they can be traced to poor management of technology and improper innovation. The goal is to alert readers to the risks ahead, make better managers and improve performance.

We identify and explain seven principal reasons which may cause a tech company to fail: Leadership, Strategy, Marketing, Timing, Finance, Operations, and Communications. We also suggest measures to prevent and predict these failures based on lessons learned; ideas and options for success.

Leadership failure is mainly caused by leader's personality traits which affect overall team performance. The personality traits we explore about are: arrogance, isolation, fear to change, lack of trust, bad executions, fatigue, and poor interpersonal communication. We also note other reasons affecting a leader's performance. A leader is the one that makes the final decisions, and this is why decision strategy is so important. Decisions can be good or bad, affecting the company in either a positive or negative way. It is important to make decisions at the right time, neither too early nor too late. As a leader during innovation, it is of key importance to know when to improve a product, when to introduce a new product, and how to adapt transferred and acquired technologies. In other words, timing is of importance to keep a company, its products, and its technologies competitive. Being aware of your surroundings and what is happening in the world is essential.

Marketing is a vital category in technology innovation because it is where you touch base with customers and provide the right amount of product as well as the right expectations. There are many reasons a strong marketing scheme may fail, and there are different ways to overcome them. A lack of market can cause a company to be set back financially. Many technology companies go bankrupt because of financial failure. Preventing financial failure is a delicate task which must be done right. Operational failure is common in innovative industries due to disruptions and errors in materials, equipment, and information management. Finally, we discuss public communication errors in the industry. We review some common public relation errors. Effective external communication helps companies create their own positive public image and in addition, helps end users create confidence in a about company's products and services.

II. LEADERSHIP LETDOWN

Leaders are usually very ambitious, and eager for more power and wealth. There are many ways a leader of a company can cause a business to not perform well. Some of the reasons why this happens are part of their personality, the way by which they do business, their decisions, and people around them. Some of the reasons described in this paper are: arrogance, isolation, fear of change, distrust, bad execution, leadership fatigue, and lack of communication [6] [7]. These reasons seemed to be the most predominant amongst the literature research.

A. Arrogance

Arrogance can be a big concern especially since part of being a leader means working in a group and listening to what other people have to say and being able to see between right and wrong in an objective manner. Carly Fiorina, HP's CEO from 1999 to 2005, once said that a business was a result of the entire organization working together, not just the leader [8]. Therefore, a leader has to listen and include the team in decisions in order to succeed. The "last words" will be said by the CEO, but these are made as a team. If arrogance gets in the way, then not only can you make many

mistakes by not listening to others but by being too confident as well. IBM was guilty at the top level not listening to its customers and employees [8]. This caused the business to enter late on portable computing, which set their portable computing products back in the market.

B. Isolation

Isolation can also cause leaders to not pay attention or get disconnected from what is going on around them, and focus just on their own "world", which can blind them from reality. It can also cause a leader to be single minded and maybe even focus too much on side tasks affecting his/her team negatively. Paying too much attention to detail will lead him/her to even side track from the main goal. For instance, IBM decided to stay in its own technology by building desktop computers instead of moving with where the technology was heading at the time. It isolated itself from what customers wanted and then decided to join a little late to the portable computer market. However, it was too late for the company to survive. Just as Cisco's CEO John Chambers said that isolation might lead to bad decisions. IBM was a strong company and with no doubt it could have taken the competitive advantage in the market if it would have not isolated itself from its customers and employees [8]. However, IBM got too distant and missed the opportunity.

C. Fear to change

Another key factor in leadership failure is fear of change or being too cautious. "If as a leader you are not taking risks, you are never going to break away and great companies don't exist by not taking risks," John Chambers, CEO of CISCO Systems, Inc., said [8]. Sometimes these risks are not going to be right but you learn from them and sometimes they will come out as a great success. Blockbuster survived the change from VHS to DVD, but it didn't take the next step that went from store to self-kiosk or even web. The fact that it did not incorporate this feature to its business; it could have had a website that allowed customers to go online to rent movies and watch them offline as well. Although the company has gone online, instead of leading it is just to catch up with the industry. Many stores have been closed and financially the company is not doing well [9].

D. Distrust

Distrust within an organization can be detrimental to the functionality of a company. It slows down progress, causing the team to become inefficient. It also creates a negative environment within the organization. Doubt can happen when a leader is new to a team or when a drastic change in team performance is made by the leader resulting in confusion. When a leader is new, there is a development stage where the team has to adapt and learn to trust his/her decisions. In this case, the CEO has to gain his/her status in the company by listening carefully to the employees and proving his/her capability. If the CEO makes drastic decisions, especially during harsh times, then the organization may get confused and become instable [8].

E. Bad Execution

Bad execution can cause things to not get done by being indecisive and not be delivering on commitments. This can also be caused by getting side-tracked, not having a specific goal to follow, or not being organized enough to keep the company track. For example, Blackberry could easily fall into this category since CEO, Mike Lazaridis, did not prepare the company for the up-and-coming rivals. The company was very successful during the years 2007-10, but other competitors were entering the market to make a move on the smartphone market. Lazaridis evidently did not see a threat; this leads to bad execution on his art as leader. Other big mistakes were the glitches in their PlayBook tablet and a four day outage of their phones' internet access, emailing and texting [10]. These badly executed moves create a bad image for the company; it upsets customers. Eventually, profits and market share are undermined. In fact, Blackberry cut 40% of its workforce in 2013 due to its big loss.

F. Fatigue

Leadership fatigue can also lead a company to negative results as people lose interest; work becomes a routine; or results are not coming in fast enough or the passion is lost. When works becomes a routine and the same thing is being done over and over, this can mean insanity to some. "Insanity: doing the same thing over and over again and expecting different results," Albert Einstein said [11]. Look at Michael Dell's decision to resign as CEO of Dell Computers, in 2004, only to return in 2007, but by then the company had already lost its appeal to customers [10]. The fact that Mr. Dell resigned does not necessarily show he was tired of working with the company, but it may have resulted in part from routine or burn out. During the time that he was not around, Dell's market share fell from 15.9% in 2006 to 10.7% in 2012 [10]. Working with a company for a long time may guarantee a team that he or she knows its culture and its processes. However the passion can be lost at the same time, so a significant change is needed to create a spark again.

G. Miscommunication

A leader needs to communicate with the organization enough so that everyone is on the same page. In addition, the leader needs to be open and accessible in case the organization has to contact the leader for support, decisions, or problem solving. For example, WorldCom was once the second largest telephone long-distance company in the United States. Its financial groups scattered throughout many states. Communication in this case was very poor and employees lacked the support from their leader, CEO Scot Sullivan. This lead to some biased management decisions [12]. It is difficult to communicate when a company has expanded to different areas. Communication in many cases is underestimated, but it is a main problem that we face on a

daily basis. Carly Fiorina talks about the importance of communication as a leader, especially when you are brand new to the company, you need to think about how you are approaching people and how receivers are going to perceive the message that you are trying to communicate. As a leader, the need to be aware of what you said or you have done is a key [8].

H. Other Factors

There are many others reasons that can bring a CEO to lead a company to downfall such as volatility (mood swings), mischievousness, perfectionism, eagerness to please, change of business model, and inability to hire well. There are also external factors that can cause a company to lose its position such as financial issues, crisis, media, and many others. There is also conflict of interest that can form a noticeable part of the role played by a CEO. For example; in 2008 when the stock market dropped, Varvitsiotis Architecture, a company based out Oregon, was greatly affected as customers cancelled their projects. The company's dealing with the private sector mostly was a mistake because the public sector financed by government organizations could have helped minimized the cancellation of projects [13]. McClendon, Chesapeake's CEO, is another example of conflict of interest. Reuters found McClendon was running a $200 million hedge fund from company headquarters. Weeks later McClendon resigned [13]. Lastly, there are inherently bad qualities in some leaders that can lead to failure such as: incompetent, rigid, intemperate, callous, corrupt, insular, and evil.

In order to be a good leader for innovative technologies, he/she should have the following 10 characteristics [14] [15] [16] that help a business to achieve success:

1) Strong leader: He or she is able to lead people along the way and motivate them at any given time.
2) Visionary: Articulating a vision well and having followers that are willing to work hard to get there.
3) Change Agent: The person makes sure that change happens across the organization.
4) Good listener: This allows him/her to understand real customer needs. The leader should actively listen to what employees and users say.
5) Logical thinker: Innovation can lead to conceptual biases, which can cause influence decisions in the wrong direction. A logical approach for decision making is critical.
6) Team builder: Success is accomplished with a team; therefore, having a leader that can assign responsibilities and make sure these are met is important.
7) Even-keeled: It is important to be very in control of your emotions in order to deal with conflicts, decisions, and people.
8) Passionate: Passion acts as the needed fuel in order to change the picture through innovation. Such enthusiasm can also be contagious to others, therefore making the work more interesting and successful.
9) Optimistic: Delivering positive messages in every opportunity is important because it keeps the team members happy and encouraged.
10) Salesperson: The leader needs to sell the idea to many people, first to executives in order to fund it, then to employees to do it, and to customers so they want to purchase it.

III. STRATEGY: WHY IT MATTERS

Strategy is all about decision-making. Good or bad decision is all a matter of choice. Mistakes are easily made between a stretch goal or a list of things you expect to happen and a real strategy [17]. Whereas, strategy is most commonly define as: "a high level plan to achieve one or more goals under conditions of uncertainty" [18]. In other words, it's the art of defining a pattern in a stream of decisions. Strategy is often confused with planning, while it contrasts in many levels.

State of art technology innovation does not necessarily lead to immediate market success [19]. Behind all breakthrough or disruptive invention, there is proper strategic management. We have learned from the empirical studies that product success is based on the ability to properly integrate strategies of matter (technology) with strategies of money (markets) [20]. Such integration is far from trivial, and even companies like Kodak, that once owned the hill, tumble down and lose their crown by failing to make the right strategic choices [21].

Strategy proves its value mostly during a business turnaround. Good management can foresee distress forces, and internal and external potential crisis' causes. It is a synonym of success [22]. Knowing those factors, including internal and external forces which may result in financial crisis, as well as how to avoid future business failures, is critical.

In this section, we want to clarify how a bad strategy can lead to a business failure. We will dig into the most common mistakes in this aspect of management. We will also address what a savvy strategy is, and what management capabilities are necessary to enable enterprise-wise decision-making.

A. Poor Strategy

Bad strategy has many roots mainly taking form from the inability or unwillingness to choose. Failure in facing the problem, mistaking goals for strategy, bad strategic objectives, and template-style strategy, are common roots of bad strategy [23]. It is a risk of failure to substitute proper leadership and the power of a shared vision with cheap motivational speech because of reducing them to something of a formula.

Companies like Kodak or Xerox perfectly illustrate such mistakes [21] [24]. Kodak management's inability to see digital photography as a disruptive technology, signed its death warrant. As the technology was developed, Kodak did little to prepare for the later disruption, missing the market. In

fact, it made exactly the same mistake which George Eastman, Kodak's founder, had avoided in foreseeing the impact of innovation on markets. Eastman was a clever leader and had savvy management skills which permitted him to anticipate the benefits of color film even though it was demonstrably inferior to black and white, which Kodak dominated at that time [21]. Considering its successful past decisions in similar situations, Kodak top management missed the mark. It failed to use market intelligence properly and make the strategic choice. That doomed the company. Similar stories happened with Xerox's Palo Alto Research Center (PARC). Many of the core elements of information technology's finest inventions find their roots from research at PARC, however, Xerox did not manage to take advantage of the fruits of those efforts [24] because of a bad strategic R&D management. Other's reaped the reward.

The examples mentioned above demonstrate four areas in which organizational structures can hurt decision-making and lead to complications: the peculiarities of the leader (the CEO, typically), dynamics at the top management of the company, the organizational structures themselves, and the tools companies use for determining strategy [25]. Many corporations, like Xerox, HP, and Nokia, had innovations but were not willing to commercialize them. Their fear to take risks, to use new technologies, and to take over new markets lead them to troubling situations.

To go further, there are legitimate technical and constitutional factors involved in bad strategic choices. Anthropological studies underscore the difficulties for people to interfere with complex decisions. In other words, humans are hardwired to come up with bad strategies in certain situations. Consequently, to fill this lack of ability, superficial abstractions are made up to mask the absence of deep thought. "A flurry of fluff" [23], fluff is a restatement of the obvious, combined with a generous sprinkling of buzzwords that masquerade as expertise. This should be considered as a hallmark of mediocrity and bad strategy. Also, this could explain the reason for poor leadership in general and the implementation of a "template-style" strategy [17]. In light of poor capacity to make right strategic choices, a fascination with positive thinking and template-style planning have burst out.

B. Good Strategy

Good strategy, in contrast, works by focusing on a few essential pivotal objectives whose accomplishment will lead to a cascade of favorable outcomes. Three stages are required to define those objectives and to accomplish them: a diagnosis, a guiding policy, and coherent actions. An example of a perfectly well handed turnaround due to a proper strategy is Apple's save in 1997 by Steve Jobs [23]. He cut Apple back to a core that could ensure its survival. He took several simple well-analyzed actions, diminishing the costs and simplifying the product line, which changed Apple radically. This example perfectly illustrates the job of the leader. As discussed in the previous section, prestigious leadership is essential to success. The strategist has to create conditions that will make the push effective and a strategy worthy of the effort called upon. It also requires a strong inherent or respected authority so needed actions will be taken.

Technology strategy is also establishing an interface between R&D and business divisions [20]. It is critical to properly manage critical elements of R&D, especially the relation with marketing, to carry out an invention efficiently. Kodak is a very good illustration to this significant point of why it matters as explained earlier.

To summarize, a good strategy has coherence, coordinating actions, policies and resources necessary to accomplish an important end [23]. If you fail to identify and analyze the challenges, you do not have a strategy [23]. To possess a good technology is not sufficient. You also need a good management. To avoid a general crisis, external and internal factors need to be controlled and risks need to be diminished. A good strategy helps in that matter.

Furthermore, companies need an efficient strategy to foresee the adequate changes customers want. They have to clearly determine what the market needs, in order to make the right decision in decisive moments. It is very important to understand the reasons for conflicts that may arise from poor decision-making and management. We saw that strategy was all about pivotal decisions and actions. Nevertheless, timing is also a crucial key point in strategy. Technological inventions need to flourish in a market at the right time. If it is either too soon, or too late, the possible fruits of the innovation are already lost. Thus, we are now going to discuss the matter of timing in business failure due to innovation.

IV. TIMING

As discussed, there are many factors that make a company successful in the technological industry. One of them is to master timing. This factor is strongly related to the technology life cycle because every technology has a beginning and an ending. There are three main factors to be considered: timing to improve the technology (incremental improvement), timing to introduce a new technology/product (disruptive innovation), and timing to adopt the new technology. If a technology company masters these factors, it will be successful and dominant in terms of technology industry especially in regards to innovation.

A. Incremental Innovation

The first factor in timing is to improve the product. This component relates to s-curve (Fig. 1). The company needs to adopt other technology to improve the current product in order to extend the product life cycle. It is especially important when a product approaches the end of life circle [20]. For example, when Ericsson introduced T68, it was the first cellphone using color display in the market [26]. A company needed to improve its product to explore more

opportunities and grab the market share from competitors and dominate and capture the market. For example a successful company hitting the timing improvement is Google with its Android operating system; it usually updates the operating system once a year. On the other end is Nokia which missed timing improvement when it introduced Meego operating system to customers [27]. It needed to do improvements during the infection point in order to help customers transition a new technology breakthrough. For example, before blue-ray was introduced into the market, the company making video players introduced dual layer DVDs. DVD storage density was increased from 4.7 gigabytes to 8.5 gigabytes to help with the transition phase.

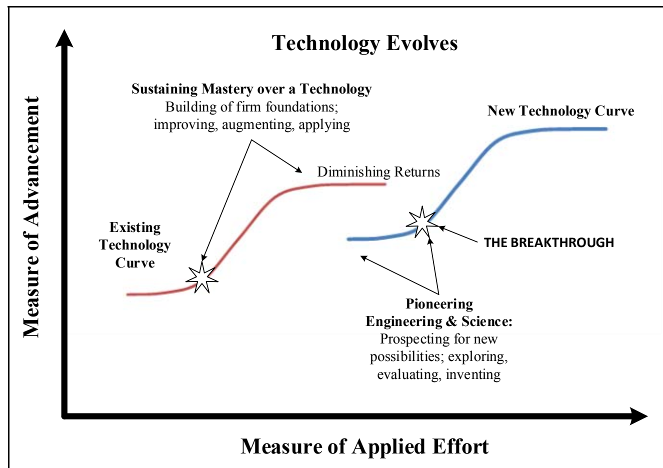

Fig. 1 - Technology S-Curve

B. New Product Introduction

The second factor is when a company introduces its new product (radical change) to customers [20]. The first variable the company needs to know is whether its existing market share can be sacrificed but it still maintains its sales or competition when the new product is launched. The company that successfully implements this strategy is Apple when it introduced iPad to customers. Even though its iPod touch was the most popular music player, its sales dropped significantly but the company gained more sales from the new product iPod. On the other hand, there are two technology giants such as Nokia and Blackberry that missed their timing to introduce their technologies and innovations. In 2007, before Apple introduced iPhone, Nokia had 40% of global smartphone market with $2.6 billion net profit [28]. Instead of trying to innovate its product some more, the company 'relaxed' and became comfortable with Symbian technology leading the market. The company believed that competitors wouldn't catch up until the Apple coming out with IOS and Google coming out with Android passed its sales. Nokia lost its 20% market share, and resulted in 1.36 billion sales lost [29], and ended up being bought by Microsoft [30]. Blackberry is another example of timing failure. Base on many sources, Blackberry should have launched its new operating system BB10 in the second or the third quarter 2012 before it lost more market share. In fact, the new product was delayed almost seven months [31]. Because of delaying or missing its timing to introduce the new product, the company lost its market share and the customer trust, which caused its stock to drop from $227 per share to $8. Blackberry is now on the edge of go bankruptcy or being acquired [32].

C. Adaptation

The third factor of timing is that a technology company needs to adapt the transferred or acquired technologies [20]. The company needs to recognize other technologies to help it leap frog or complement its product in order to make its product competitive. One successful company in this area is Google. Google acquired self-driving technologies by recruiting Sebastian Burkhard Thurn [33] from Stanford University. Sebastian [33] led the development of the first self-driving car in 2005 and won DARPA, the US military's competition. Google brought the technology into Google X-lab to further develop and commercialize this technology. Google successfully improved the technology and integrated the technology with sophisticated software and other Google technologies such as its advance map technology. This extends Google's tentacle into automotive industry by making self-driving cars. Google made the first driverless-car tested on road. This will dramatically change the automotive industry and may help Google to develop its new business model – "business model innovation". Not all things in Apple and Google are successful; they missed as well when they adopted technologies [34]. For example, Apple's iTunes Radio that was announced in June 10, Apple missed the timing to adopt the technology from competitors alongside its stealer and profitable content store. Now Apple could only take five percent from the overall streaming music business. Apple fell behind other music streaming service providers such as Pandora with 39%, iheartradio with 11%, and Spotify with 9% [34].

Most technology companies now are not aware about the importance of timing to improve their current products, timing to introduce their new products, and timing to transfer the technology in the overall success of their companies. This may happen when their products enter from mid infection point toward to end of the S curve (end of their product life circle), but most of companies don't realize it. This is because rapid changes make technologies hard to be predicted and measured. Understanding, mastering, and recognizing the timing is very critical because it can lead a company to be failed or successful.

When we launch a new product, the market strategy will also determine our success or failure. The following section will discuss the potential failures when a company markets its products.

V. MARKET FAILURE IN BUSINESS

Market failure is a concept encompassed in economic theory where the amount of products demanded by customers

in a certain market is not equal to the amount that is supplied by manufacturers and suppliers. It is a situation where there is inefficiency in the allotment of goods and services by free markets [35]. We will delve into issues of market failure by analyzing examples of market failure by famous companies. The causes of market failure and its contribution to innovation failure will be highlighted in the section. Finally, we will discuss how to manage and overcome market failure.

A. Causes of Market Failure

This is caused by a lack of equilibrium in the market due to the absence of particular economically ideal factors [36]. Some of the ideal factors that cause market failure include:

1) Market power
   Significant start-up costs or economies of scale may predominate in some industries. In such an instance, an inefficient market situation is possible if a firm successfully excludes other firms to the disadvantage of potential participants in the market [37].
2) Transaction costs
   Markets cannot function efficiently in cases where the costs of engaging in a trade are initially high [38].
3) Irrational actors
   Irrational actors might favor short-term benefits by ignoring long-term costs. Such actors weigh the factors inappropriately when making a trade [39].
4) Imperfect information
   This occurs when one of the parties in a trade has material information that the other lacks, or information that could potentially affect the price or the probability of a certain trade [38].
5) Externalities
   These are factors that are beyond the control of consumers or producers. These include negative factors like natural calamities, economic downturns. Positive factors like economic recovery and purchase of luxury products also might cause market failure [40].
6) Imbalance between perceived quality and the price of a product
   In instances where consumers perceive the price to be fair given the quality, there is an increase in demand. If producers are not able to meet the increased demand, there will be a market failure [38].

B. Market Failure and Its Contribution to Innovation Failure

Market failure can contribute to an innovation failure. Market failure causes poor performance of a product. Poor performance results in loses due to failure to recover the capital invested in the product through increased sales [38]. Additionally, market failure reflects on the high cost of production. This implies that organizations invest a lot of capital in producing products [38].

This might be occasioned by high prices of raw materials and labor. For instance, industry regulations can be causes of market failure. The minimum wage policy can increase the cost of production by increasing the wage bill of an organization. These conditions kill innovation because organizations may not have the capital to invest in new products. This is also accelerated by instances where new products have not been picked well in a free market [40].

The technology adaption has a life cycle (Fig. 2), and there is a gap, called as a CHASM which is between the early adopters of the product and the early majority. When we market a new product, the most challenging task is to make this CHASM, the transition between early adopters (visionaries) and early majority (pragmatists), shorter. Companies should create effective marketing strategies to shorten this CHASM. Otherwise, companies may run into financial failures. They may not have money to do further development, or they have to kill the product because the market does not accept the product. When Apple launched its iPod, the company market strategy was very successful and quickly passed the CHASM. When Nintendo launched DS or Wii, the market strategy was also very successful. The company passed this CHASM very quickly. However, when Diamond Multimedia launched Rio PMP300, its marketing strategy wasn't successful. It didn't successfully cross the CHASM.

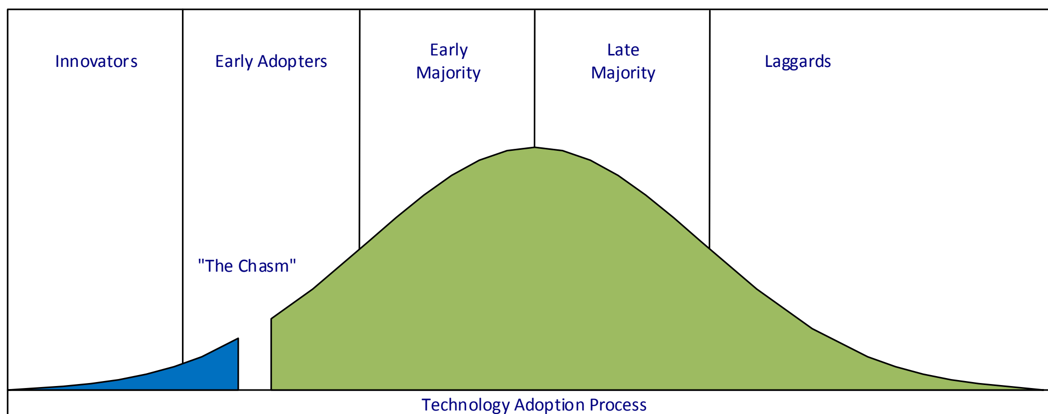

Fig. 2 - Technology Adoption Lifecycle

C. Companies Experiencing Market Failure

Famous companies have experienced market failures that have resulted in hundreds of millions of dollars in losses.

Microsoft has had a number of market failures with its products. In an attempt to curb piracy, Microsoft demanded that users of Xbox be connected to the internet constantly while using the device [41]. This angered consumers because this translated to unexpected costs for them. Play station, a product of Sony benefited from this decision and increased their sales [41]. Other products of Microsoft that experienced market failure include Windows 8. The operating system changed windows too abruptly for its users. For instance, the new product did not have the “start button.” Instead, it was moved to a tile-based layout that was too cumbersome for typical users of windows [41].

Hewlett Packard is another famous company that has experienced market failure. Its product, the Touch Pad, runs on a webOS operating system and a solid hardware. The product was reviewed to have better features than that of its competitors. Its technology was more cutting edge that that of its competitors and it had a competitive advantage. However, after seven weeks of poor market response, HP slashed the price of the product and eventually discontinued it due to sales setbacks [42].

D. How to Manage and Overcome Market Failure

Market failure can be managed and overcome by increasing market efficiency. This can be done by ensuring that the sellers and buyers in the market have ideal and complete information concerning prices and alternatives. Additionally, competition in the market must be enhanced [43].

Through competition by buyers and sellers, equality between the supply price and the demand price is established. Finally, market failure can be managed and overcome by ensuring that all external costs and benefits in the market are abolished. The demand price ought to encompass all the value that is generated from a particular good. The supply price on the other hand out to reflect every opportunity cost of all forgone production [44].

Market failures are situations that organizations and governments ought to avoid [45]. This is because market failures not only cause losses in the millions of dollars but also kill the innovation spirit of organizations. Organizations should do that which is necessary to avoid market failure [45].

Market failure also contributes to financial failures. However, there are additional concerns of financial failures in business.

VI. FINANCIAL FAILURES IN BUSINESS

The U.S. Small Business Administration reports roughly 66 percent of new businesses survive two years or more, 50 percent survive four years or more, 40 percent survive six years or more, and companies which have good financing tend to survive longer [2].

Financial failure is common in entrepreneurial ventures and in well-established businesses. Many factors contribute financial failures. Although some factors may be beyond the reach of management, most of them could have been prevented and predicted [2] [3] [4].

A. Reasons to Cause Financial Failures

Generally speaking, improper financial planning and the management of the various financial issues contribute financial disaster. Let us find out factors culminating in financial disaster.

The financial downfall of a company results from not a single factor but a combination of a few factors. Regularly, the company runs through the various mistakes. The main factors causing the financial failures are [46]:

1) Lack of financial insight
   Management executives have less financial experience and lack of financial insight. They might just have a primary technical or engineering focused background.
2) Lack of financial planning
   A company has no financial planning, and no cashflow projections. If the company has no enough cash to carry it through the sales cycles and downward trends, it will bankrupt. Funding sources providing cash are difficult to please.
3) Low gross profits
   The gross margins are lower than industry average. The company intends to use low price policy to gain market share, but it may kill itself trying.
4) Downtrend in sales
   A company grabs market share by use of the low gross margins. The company may increase its market share at the expense of customer service, so it may cause client unhappiness and dissatification. Eventually, it may drag down its sales.
5) Expense over sales
   The operating expenses of a company are above the gross profit, which is a recipe for financial disaster.
6) Improper credit policy
   A company slackens it credit policy to assist the sales. The company would like not to offend its clients and is very lenient with collections. It will result in increasing bad debts and higher collection costs.
7) Improper Inventory
   Stock holding is above the average in the industry. In fact, these stock items may be not excellent sellers.
8) Debt
   The accounts payable is above industry norm (90 days). Interest costs will make the problems even worse.

The combination of these factors leads the company to financial devastation. No investor or bank would like to put anything into the company to financially buttress it, so the company won’t go anywhere but be destroyed and delisted.

For example, Converged Access Inc. ceased operation in 2007 because of financial failures. Investor didn't want to invest a penny into the company anymore. The factors resulting the company financial failures are: 1) Management executives lacked financial insight; 2) the company lacked financial planning; 3) the company spent over sales.

B. Measures to Prevent Financial Failures

Potential Factors resulting in financial failures have been identified. What measures must a company take in order to minimize or even prevent the probability of financial failures? The company must take two measures: financial planning and financial management [47] [48].

1) Financial Planning

A company should have planned its financial activities continually. It is required that the management has the necessary business and financial insight, understands the basics of the actual financial planning, such as financial statements, cashflows, and financial ratios, and knows if the company is making enough profits and has enough liquidity and solvency, where potential problems lie and how these problems can be solved.

The activities below should be in financial planning [47]:

a) Implement sales planning
The management must know the company's break-even sales, set realistic sales targets should be realistic, and sustain the required growth and profits.

b) Create proper credit policy
In order to gain desired market share and achieve the required sales, a company may provide credit to its clients. It is a risky policy and costs money. A proper credit policy must be strictly adhered to. The policy must have explicit statements such as what kinds of clients will get credit, under which circumstances, how much they will qualify for, guarantees that need to be in place, the credit terms and how payment will be managed.

c) Define the right price
If pricing its products is too high, the high prices may deter customers. If pricing its products is too low, the low prices may decrease the profitability of the company. The company should have competitive prices for its products. The pricing must not only keep enough gross margins to cover the financial obligations of a company and to allow for growth but also not to deter customers. The company must do enough market and completive analysis.

d) Foresee cashflow
A company should plan for sales and expenses in a timely manner. It must have enough cash at hand to pay for current expenses.

2) Financial Management

A company should continually monitor and manage its finances, need to identify and rectify issues as soon as possible. The financial aspects to be managed include the following [48]:

a) Financing
A company should finance for its capital expenditure and working capital. The need and timing for financing must be highlighted in the planning for its business and its cashflows. Financing can be obtained via different approaches. The company should know disadvantages and advantages of these approaches, and choose the best one for the company. Financing should be a part of the strategy of a company and be in line with the risk management of the company.

b) Inventory
A company should maintain its inventory at optimum levels, not too little, not too much. The company should manage and determine its inventory levels professionally.

c) Accounts Receivable
Providing credit to its customers is important way to increase its sales. However, it can deteriorate the company as well. The company should analyze debtors according to its aging. If debtors do not adhere to their credit terms, they should be diligently followed up. If necessary, their credit allowances should be revoked.

d) Business Growth
Business growth should grow as fast as that it can generate enough money to finance the company's working capital. Growth faster than that is not sustainable, and will result in the financial failure. The company should find out its suitable sustainable growth rate based upon a combination of its profitability, efficient utilization of its assets, financial leverage and retained earnings that are kept in the business and should closely monitor the rate and manage its various determinants effectively.

e) Expenditures
A company should budget for its expense items. Also, it must require explanations of any substantial deviations of actual vs. budgeted figures and filter through these effects into new budgets, cashflows and other financial projections. If the company increases expenses too much in times of rapid growth and good economic conditions, it will be difficult to curb expenses in times of economic downturn.

f) Financial Ratios
A company should use the proper financial ratios to identify problems and to correct found problems. The company should know its profitability, liquidity and solvency, where potential problems lie and then how to correct them. The company should analyze ratios on a monthly basis and compare ratios with other companies in the industry and especially to targeted and past figures.

g) Cashflows
Cashflows may determine the success or failure of a company. The company should securitize cashflows

for any potential problems and need to adjust cashflows monthly. If cashflows are ignored for a few months, a small problem can easily snowball into something that is out of control.

A. *Prediction of Financial Failures*

We have discussed the factors that contribute the financial areas and measures to prevent financial failures. Is there a way to predict potential financial failures? A financially troubled company goes through stages – underperformance stage, early decline stages and late decline stages. Adverse trends in financial ratios can be used to track these stages. Z-Score methodology combines all financial ratios into an overall measure of financial health [49]

Z-Score, also called as Altman's model or Altman's Z-Score was developed by Edward I. Altman [50] [51]. The original Z score was as follows [52]:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$$

Where X_1 = Working Capital/Total Assets. This measures liquid assets in relation to the company's size.

Where X_2 = Retained Earnings/Total Assets. This is a measure of cumulative profitability that reflects the company's age as well as earning power.

Where X_3 = Earnings Before Income Taxes/Total Assets. This is a measure of operating efficiency separated from any leverage effects.

Where X_4 = Market Value of Equity/Book Value of Debt. This ratio adds a market dimension.

Where X_5 = Sales/Total Assets. This is a standard turnover measure. However, it varies greatly from one industry to another [52].

Altman found the following significantly different ratio profiles for the two groups:

TABLE 1 - TWO DIFFERENT RATIO GROUPS [52]

	Bankrupt	Nonbankrupt
X_1	-6.1%	41.4 %
X_2	452.6%	35.5 %
X_3	-31.8%	15.4 %
X_4	40.1%	247.7%
X_5	1.5%	1.9 %
Z	-0.25	4.88

To assess any company's likelihood of bankruptcy, we would compare their Z score with the predetermined cutoffs shown below:

- Bankrupt < 1.81
- Zone of ignorance 1.81-2.99
- Nonbankrupt > 2.99

The Z score has been successful used in the real world for predicting financial failures. It correctly predicted 72% bankruptcies. Z score profiles for failing businesses often indicate a consistent downward trend as they approach bankruptcy [52].

Altman's Z score is the tried and tested formula for bankruptcy prediction using financial coefficients. It has been demonstrated to be quite reliable in a variety of contexts and countries. However, it won't fit in every situation. Before using a Z score to make predictions, it is necessary to adjust these coefficients to best fit for your situation [52]. Sittichai Puagwatana et al [53] don't use Market Value Equity/Book Value of Total Liabilities but employ adding one new ratio to the model which is Net income (loss)/Amount of Shares.

Shi-Ming Huang et al [54] also present a hybrid financial analysis model including static and trend analysis models to construct and train a back-propagation neural network (BPN) model to predict financial failures. The model is used to four datasets of Taiwan enterprises which support that the proposed model not only provides a high predication rate but also outperforms well.

If a company doesn't operate well and continually, it will cause a failure. The following section will analyze these failures.

VII. OPERATIONAL FAILURE

Operational failure is seen in companies in most industries, from causes which include disruptions and errors in materials, equipment, and information [55]. The causes of the failure stem from poor equipment maintenance and coordination problems within the business [56]. The consequences of operational failure could affect the quality of product and service, cause direct harm to employees and customers, and eventually it could impair company's financial performance [57].

Most of the time failure in operation is the result from the troubles encountered in the enterprise resource planning process. Enterprise resource planning (ERP) is a software solution, which integrates all the information flowing in a company, including financial, accounting, human resources, supply chain, and customer information [58]. ERP system implementation is not just a technical system implementation; it will also include business process engineering (BPR) [59]. From previous studies, BPR uses modern information technology to improve performance [60]. It also stated that BPR and ERP are inseparable twins.

ERP system plays an important role in business; however, even big companies like Nike, Whirlpool, and Samsonite suffered through failures and encountered difficulties with the implementation of the system. Previous research stated that one of the main managerial problems during the implementation of ERP system is the conflict with consultants [61]. Based on previous study, there are couple critical factors that may lead to ERP failure [59]:

1) ERP system misfit
   Poor ERP selection and evaluation would lead to ERP software misfit.
2) High turnover rate of project team members

Due to stress and heavy workload, high turnover rate of project team members may occur. This would further lead to insufficient knowledge transfer within the team.

3) Over-reliance on heavy customization
   Heavy customization would lead to project delays, overspent budgets and give the key users bad impressions of its output.
4) Poor consultant effectiveness
   Poor consultant effectiveness is the result of poor communication and lack of experience.
5) Poor IT infrastructure
   Poor IT infrastructure leads to the slow processing capability of the ERP system.
6) Poor knowledge transfer
   Not all consultants are professionals in the use of ERP system. This would lead to poor knowledge transfer from the consultant to project team members.
7) Poor project management effectiveness
   Poor project management effectiveness is the result of limited knowledge and capability in ERP implementation, as well as the lack of communication with consultant.
8) Poor quality of Business Process Reengineering (BPR)
   Poor quality of BPR would mislead the way of implementing ERP to the company.
9) Poor quality testing
   Insufficient support from top management would hinder the implementation process; the result of over-tight project schedule and insufficient testing in ERP system would lead to low quality result.
10) Poor top management support
   In order to reduce budget of the ERP project, top management tend to set too tight a project schedule. This pressure would further lead to poor knowledge transfer.
11) Tight project schedule
   In order to reduce budget of the ERP project, top management tend to set too tight a project schedule, this would further lead to poor knowledge transfer.
12) Unrealistic expectations from top management concerning the ERP system
   Unrealistic expectation from top management leads to superficial project planning and underestimation of budget and resource allocation.

From the critical factors mentioned above, we can see that the effectiveness of consultants for ERP system is crucial. ERP consultants are the third parties hired for their expertise, for which the transfer process of knowledge would greatly affect the result. We can see the relationships between critical failure factors; for instance, poor consultant effectiveness would lead to poor knowledge transfer. Without efficient ERP knowledge, team members will not be able to implement the system correctly and effectively, and eventually lead to poor quality.

There are a couple examples for ERP failures. Nike spent $400 million dollars upgrading their supply chain and ERP system, however, the result was a $100 million dollar in lost sales, 20 percent stock dip, and multiple lawsuits [56]. Nike aimed to upgrade their system into one super system with the combination of ERP, supply chain and CRM project. HP's centralization of its ERP systems onto one SAP system cost them $160 million dollars, which is over five times the estimated cost. This is a good example of the unrealistic expectations from the management team [62]. FoxMeyer adopted SAP R/3 system too early without enough knowledge, in the end the company was driven to bankruptcy [63].

The ineffective communication externally and internally also may cause a company failure. The subsequent section will focus on this kind of failures.

VIII. COMMUNICATION ERRORS IN THE TECH INDUSTRY

High tech industries are especially vulnerable to communications failures, in part because new technologies and/or new companies are much publicized events, products, and failures. Interested in how such communication failures can affect the tech industry, crisis management, and public relations, this section focuses on recent failures of Lithium batteries in the transportation sector, Boeing, Tesla, and Fisker automotive to see how corporate communications address such failure. It may be too early to see if they are successful but seeing the corporate responses to these events proves an interesting framework for examination. The photo [64] demonstrates catastrophic car failures caused by battery problems (specifically the Fiskers' battery fires resulting from a salt water surge during an East Coast hurricane).

Seeing such a picture in the media, the public might be told the problem was caused by some defect in the batteries. (An inundation of salt water shorted out the battery circuit causing a massive fire.) The visceral response is that you won't buy this kind of car with this kind of battery because it is perceived as inherently dangerous. If the company doesn't effectively communicate with safety authorities and the public, and work to eliminate this negative impact on customers' about their products, the product will fail. Untried, new technologies may be especially vulnerable to safety concerns. What's the take-away? It is the media image.

These industries, using lithium batteries, are oriented to high end automobile buyers such as Tesla or Fisker, or corporations deciding to purchase large aircraft, like Boeing. The general public reacts virulently to news of these failures, and seems to delight in them. However, the stakeholders looking to actually purchase these technologies, will research in detail the issues involved, the relative safety statistics comparing all auto fires to battery fires, and look to place them in perspective balanced by their own needs to purchase new technologies. There lies the communication issue - how to deal with what the public considers a failure, and restore confidence to the public generally.

Whereas, it would seem that the practiced corporate response to date to the lithium battery fire issue is to say as little as possible; to play out the response in a very cool, unattached, unsympathetic way. CEO Elton Musk took to blogging to directly bash the media for Tesla's Model S bad publicity, by-passing conventional modes of press conferences and public relations firms' appearances.

A. Failure and Organizational Crisis

Organizational crises arrive in all kinds of shapes and sizes, but they are characterized by the description of a low-probability, high-impact event which could challenge the organization's survival. The tough part is that there is often a high degree of ambiguity related to the actual cause of the crisis and similar ambiguity as to the best way to resolve it [65]. And resolve it quickly. Even with careful early warning systems, business leaders are expected to manage such crises effectively [66] [67].

Control of communications about a product or system crisis is difficult when the failures are so public - caught on film and shared in social media. It is no longer a matter of preparing for the evening news to bring a crisis to light, but it is instantaneous, 24/7, and a response is expected in near instantaneous manner to match the reveal. For example, the Tylenol PR crisis from 1982, when through no fault of the company itself, someone tainted multiple bottles of Tylenol with cyanide killing seven, created a mass fear of the product. Networks news covered the story in depth as deaths were credited to Tylenol's product.

How did the Johnson and Johnson respond? Immediately, compassionately, and proactively: they immediately alerted the public, as they voluntarily pulled the product from store shelves 31 million bottles at a cost of over $100M, then while the crime investigation continued, they developed taint-proof caps. The crisis is overcome almost immediately (relatively), Tylenol maintains a huge market share of pain relievers today, and is used in 70% of U.S. households.

The danger of these failures is that the public will start to pay attention. The public knowledge and awareness of battery failure builds up slowly from their own personal experience [i.e.: batteries in 'my laptop' have declined significantly], and those broadcast through major and social media networks [watch the fire and imagine the impact of that happening in 'my attached garage' setting the whole house on fire].

B. Solutions for Communicating

A big part of the communications effort is creating the right image for shareholders to maintain and grow stock value. Tesla stock rose significantly with the US consumer report rating for the best auto, yet dropped as news of the battery fires increased. It remains lower than anticipated based on the positive bounce from review guides.

There is always the danger in a communication crisis for top managers to look for a scapegoat, one to take the fall, or to assign blame to. Just as in presidential politics, there is always someone to fire in order to protect the existing hierarchy. Also, in the heat of the moment, superficial remedies are sought which don't rise to true problem solvers [68].

There are many solutions to study for effective communications during a crisis, but most important are: The presence of an established, pre-written plan. This plan to some degree serves as a guideline, can be used in training prior to a need arising, and establishes best practices. Ideally key media contacts have already defined and hopefully, vetted. Effective plans must be updated periodically and made available to key personnel within an organization [69] [70] [71].

Communications within and without an organization will always be a challenge, even more so during times of crisis. If senior managers are savvy to the implications of statements they make to the media, how their company is portrayed in social media, and how resourceful they can be in problem solving, the crisis will turn into an opportunity to communicate core values and corporate responsiveness.

IX. CONCLUSION

In the paper, we categorize causes resulting in potential business failures into what we believe to be the main reasons: failures caused by poor leadership, failures caused by companies strategies, failures caused by ineffective marketing plan or strategies, failures by late timing, failures caused by poor financial planning and management, failures caused by in efficient operation, and failures caused by ineffective communication. There are many other factors affecting a company's performance, some of those are external vs. internal. We focused mostly of internal factors happening in the company rather than external influences such as crisis, media, competition, and so on. We explain these failures and identify common mistakes we can see from failure cases. By analyzing causes resulting in business or innovation failure, we state measures to be taken to prevent companies from failures. In fact, these causes are not isolated but intertwined with each other. Poor leadership may result in bad company strategies. Failures in marketing may have the company get into financial dilemma. Effective external communication helps companies to create their positive public image especially during crisis. This can give investors or stock holders enough confidence about them. Otherwise, they might get into financial trouble.

Although companies also can use Z-score to estimate their financial healthiness, they need to find out right coefficients to rebuild the predict model. They cannot just use the current coefficient to do prediction.

Businesses failures can be traced to poor management of technology and improper innovation.

We are expecting our work can help companies to avoid future failures or at least create some sort of awareness on common mistakes that are currently happening in businesses so that these can be dealt with on time. Further research can be done by specifying on certain companies or by

interviewing personal from companies that have indeed failed to succeed. What causes are often seen and what some causes are dominating may be future topics too.

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