Strategic Analysis Tools for High Tech Entrepreneurs

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Abstract

High Tech Entrepreneurship is characterized by high levels of technical, market and financial uncertainties, rapidly declining prices, collapsing markets and shortening product life cycles. Conventional strategic analysis tools are inadequate for effective analysis in developing high tech marketing strategy for start-ups. This paper reviews a portfolio of contemporary strategic analysis tools that have been used effectively in developing high tech marketing strategies and case analyses. These include the Boston Consulting Group's (BCG) Portfolio Matrix, The Technology Adoption Life Cycle, The Whole Product Concept, and Disruptive Technologies Mapping. Some of these tools have been effective in alleviating the Engineering – Marketing interface issues in high tech start-up companies. The implicit relationships between these tools are also explored.

Introduction

The high levels of technical, market and financial uncertainties that characterize high tech entrepreneurship have resulted in shortened product life cycles, collapsing markets, and rapidly declining prices. Conventional strategic analysis tools such at SWOT analysis, Michael Porter's industry structure analysis model and product positioning matrices, by themselves, are inadequate for developing a comprehensive marketing strategy for innovative high tech products and technologies. This paper examines contemporary strategic analysis tools such as the Boston Consulting Group's BCG Product Portfolio Matrix, the Technology Adoption Lifecycle, the Whole Product Concept and Disruptive technologies Mapping. The implicit relationships between these tools is also explored. These tools have been successfully used and tested by the author in high tech start-up organizations to develop comprehensive marketing strategies for innovative high tech products, and in academia for case analyses. These tools have also played a critical role in alleviating Engineering – Marketing interface issues, by providing a forum that focuses on the product features, customer demands, competitive offerings and standards compliance.

The Boston Consulting Group's Product Portfolio Matrix

The Boston Consulting Group's Product Portfolio Matrix is a well known tool for the high tech entrepreneur. It was developed as an approach to product portfolio planning. It has two controlling aspects namely relative market share (relative to competition) and market growth. [1,2]

To use this tool, you would look at each individual product in your portfolio and place it onto the matrix. You can then plot the products of your rivals to give relative market share.

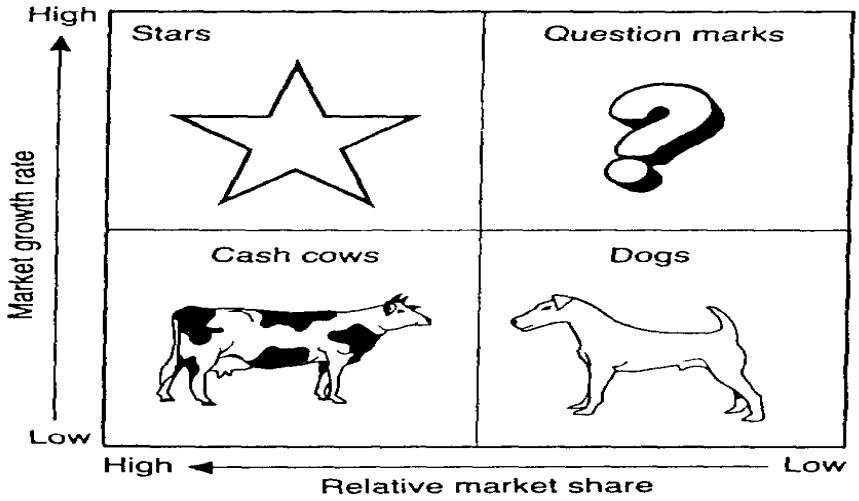


Fig. 1. BCG Portfolio Matrix

This is an overly simplistic representation and has some understandable limitations. Each cell is broadly categorized as follows:

Question Marks: These are products with a low share of a potentially high growth market. They consume resources and initially have low profit margins. They have the potential to become Stars. They absorb considerable financial and human resources(for R&D, marketing, production ramp up, etc.) as you attempt to increase market share. At the outset, the portfolio of the high tech start-up consists of a number of Question Marks.

Stars: These are products that are in high growth markets with a relatively high share of that market. Stars tend to generate high amounts of income. Keep and build your stars.

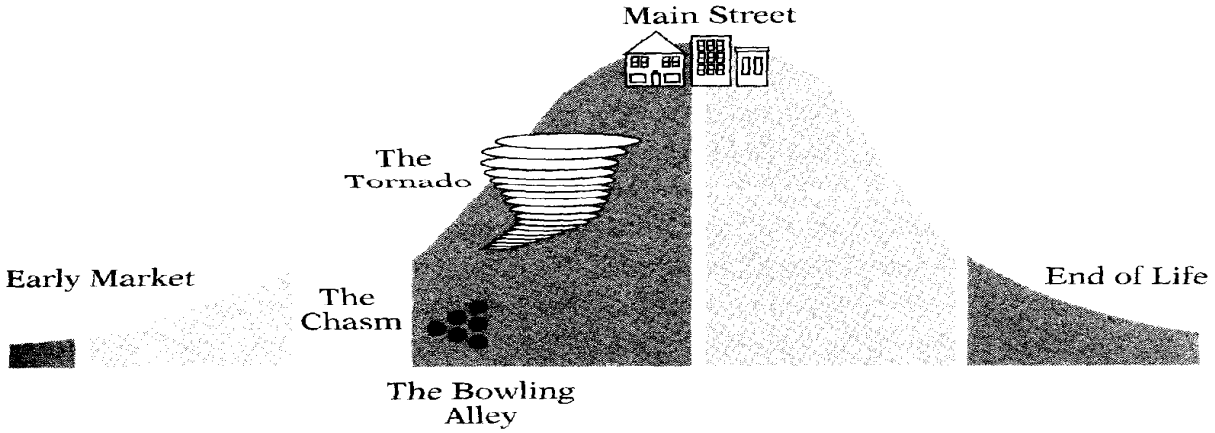
Cash Cows: These are products with a high share of a slow growth market. Cash Cows generate more than is invested in them. So keep them in your portfolio of products as long as they generate appreciable cash flow and maintain market share. Mergers, acquisitions and strategic alliances can

also help a start-up accumulate Cash Cows in its portfolio.

Dogs: These are products with a low share of a low growth market. They do not generate cash for the company, they tend to absorb it. It is recommended to divest / discontinue these products and use the proceeds and savings to turn Question Marks into Stars.

The goal is to look for some kind of balance within your portfolio. Try not to have any Dogs. Cash Cows, Question Marks and Stars need to be kept in a kind of equilibrium. The funds generated by your Cash Cows are used to turn Question Marks into Stars, which may eventually become Cash Cows. Initially, for start-ups, most of the product will be in the Question Marks quadrant. However it is imperative that the entrepreneur plan what products will move to the Stars and Cash Cows quadrant over a two-year time horizon and incorporate this into the business plan. It is also possible that some products will move from the Question Marks quadrant to the Dogs quadrant because of market failure or technical infeasibility. This will have to be determined as soon as possible to re-deploy scarce resources. This also means that you will need a larger contribution from the successful products to compensate for the failures.

The Technology Adoption Lifecycle Landscape



Innovation | Early Adoption | Early Majority | Late Majority | Laggards

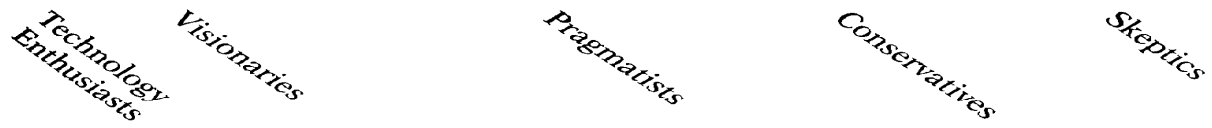


Figure 2. The Technology Adoption Lifecycle

This is a useful tool to determine where in the lifecycle the technology (or product) is and the impact of this position on the start-up's marketing and technology strategy. The Technology Adoption Lifecycle breaks down product and market evolution in high technology markets into consecutive phases of development: Innovation, Early Adoption, Chasm, Tornado (or High Growth), Maturity, Decline and End of Life. These stages correspond to the four quadrants of the BCG Matrix. The products and technologies in the "Question Marks" quadrant of the BCG Matrix correspond to the Innovation and Early Adopter phases of the Technology Adoption Lifecycle Landscape, because their potential market size is not yet proven. With their high growth rate and increasing market share, the Stars of the BCG Matrix are definitely past the Chasm and in the Tornado stage of the Technology Adoption Lifecycle Landscape. The Cash Cows quadrant represents the Maturity phase (Main Street stage) and the Dogs typically lie in the Decline and End of Life stages of the Technology Adoption Life Cycle Landscape.

According to Geoff Moore,[3,4,5] who defined the Technology Adoption Life Cycle Landscape, in his books "Crossing the Chasm" and "Inside the Tornado", attitudes toward the adoption of new technology become significant, any time users are introduced to high tech products that require them to change behavior or modify other products and services they rely upon. Products causing this pattern are referred to as discontinuous innovations. A high definition television, with format incompatible with current equipment, is an example of a discontinuous innovation. Continuous innovations, on the other hand, refer to the normal upgrading of products (i.e. a regular TV with a sharper image) that do not require any changes.

A basic marketing model was created based on discontinuous innovations, relating to psychographic buying habits, forming a bell curve with divisions roughly equivalent to where standard deviations would fall. The divisions included:

Technology Enthusiasts: To these individuals, technology is their life. Any new high technology product is good, and they will do anything they can to help the vendor get the product into the marketplace. The technology enthusiasts play the important role of "gatekeeper" with the introduction of a new product, providing access to the next segment of buyers and they dominate the Innovation stage of the Technology Adoption Lifecycle Landscape.

Early Adopters (or Visionaries): These non-technology individuals find it very easy to imagine, understand and appreciate the benefits of new technologies, relating these benefits to their own

concerns. They want to embrace a new paradigm, be there first and ride it to the top of the industry. They rely on their own intuition and vision when making buying decisions, sometimes referring to the technology enthusiasts, and are key to opening up high-tech market segments. These individuals fit into the Early Adoption stage of the Technology Adoption Lifecycle Landscape.

Pragmatists: These are the individuals whose methodology of solving problems and affairs is via practical means. They like to wait until the market is shaken out, giving them the ability to transact business with the clear market leader. They like de-facto standards, right choices and safe purchases. Because there are so many people in this segment (roughly 1/3 of the adoption life cycle), securing their business is critical to substantial growth and profits.

Conservatives: These individuals do what the pragmatists do, but essentially they do it later. They want it faster, cheaper and better. They want products that 'just work' and are 'plug n play'. These individuals dominate the Maturity and Decline stages of the Technology Adoption Lifecycle Landscape.

Skeptics: These are the individuals who simply don't want anything to do with technology and are therefore not a worthy audience to pursue.

The above model depicts marketing success by winning one segment after another, with each captured segment acting as a reference base for the segment following. Moore's model shows gaps between all of the segments, with the largest and most difficult gap to overcome being 'The Chasm' between the early adopters and the pragmatists.

The fundamental problem lies in the transition from the early adopters to the pragmatists. Careful analysis of the psychological profile of these two groups shows that they do not have much in common. The early adopters like making decisions by themselves that do not depict the norm. The pragmatists, on the other hand, want to communicate with others and put together a good decision. The key to crossing the chasm was derived by studying the fundamental differences between the last early adopter and the first pragmatist. While the early adopter would purchase a product that could deliver an 80% solution (seeing it as only 20% more to go), the pragmatist takes the position of buying when it is 100% complete (a 'whole product' as Moore puts it) and can be referenced as working within their industry. There are many pragmatists out there--all in different industries.

Moore's solution for making the transition is to focus on a 'beachhead' and deliver a total solution to one of those niche markets as quickly as possible. Identification of target customers and their compelling reason to buy are keys to fulfilling the 'whole product' concept, which will allow you to win over the pragmatists in a particular market segment.

In his book "Inside the Tornado", Geoff Moore defines the three different phases in the life cycle after the chasm:

The Bowling Alley: This is a period where your product is in the main stream but it is not yet perceived as a general purpose solution. The beachhead that helped you cross the chasm can be viewed as the 'head pin,' which can be leveraged to penetrate other closely related niche markets. The overall strategy is to target other niches that can be offered a 100% solution with only minor

product modifications. This allows the movement from niche to niche in a controlled and predictable way, building your installed customer base.

Tornado: The tornado starts when the pragmatists in the mainstream, who have seen the collective base of successful 'niches,' then decide that the product is ready for them to purchase. And, like a stampede, the pragmatists come all at once, with a vortex of product demand. Moore's strategy during the tornado phase is to 'just ship.' It is during the tornado stage that market share is set. Companies with similar products will also enjoy a piece of the market, because no pragmatists want a market without competition. The tornado phase will define a clear market leader. Securing as many distribution channels and hitting as many different price points as possible are key to obtaining new customers in this phase. Microsoft's Windows and Intel's Microprocessor launches are classic examples of tornado phases. Their aggressive beta-testing program, which signed up a critical-mass of users, was their beachhead within the bowling alley phase.

Main Street: This phase is reached when the backlog of orders that occurred during the tornado phase has been fulfilled, creating market equilibrium. Distribution channels have a 'mass-market' appeal, as opposed to the 'value-added' positioning during the bowling alley phase. Moore references a 'whole product + 1' strategy, taking the product institutionalized during the tornado and adding one minor change to it to yield one compelling reason to make a purchase. The 'plus one' strategy allows deep penetration into new niche markets, some of which will bud into other niches. Sometimes the bud into another niche can start a new tornado, an example being the laptop market as it split off from the desktop PC market.

Understanding where your product is positioned in the revised Technology Adoption Life Cycle will influence refinements or possibly an overhaul in your own agenda of marketing activities.

Targeted direct mail and interactive marketing can lay the foundation for establishing your initial beachhead. The power of databases, which offer segmentation by SIC code, employee size, and consumer demographics, can be harnessed to execute carefully planned attacks into related niche markets, building your base of reference customers whose critical mass will start your tornado.

Once the tornado hits, the companies with the developed distribution channels that deliver the ability to ship products are king. Direct mail and interactive marketing can work in 'channel unity' with the retail channel, offering users every possible method of making product purchase decisions. As you head for main street, controlled testing of modified offers will facilitate the 'whole product + 1' strategy, identifying profitable secondary niche markets and penetrating them with complete vertical depth.

Due to their targetable and measurable nature, direct mail and interactive marketing activities play an important role in implementing the overall 'chasm-crossing' strategy. However, your first step is to see where you are currently positioned in the curve. To use the Technology Adoption Lifecycle tool, one needs to plot where on the curve the different products of the portfolio are currently positioned. And then develop the strategies to move from one phase to the next. The Technology Adoption Lifecycle Landscape model extends the chasm model by defining three separate mainstream market phases of: niche markets, mass market hyper-growth, and finally mass customization. In each of these phases of market development, there are seven strategy

elements which play out against the market development models which operate as a backdrop:

1. Target customer
2. Compelling reason to buy
3. Whole Product
4. Partners and allies
5. Distribution
6. Pricing
7. Competition
8. Positioning
9. Next target

The Whole Product Concept:

The Whole Product Concept is a holistic approach to product definition and development.[6] It is graphically depicted in Figure 3, as a set of concentric circles, each representing the following:
1. Generic Product,
2. Expected Product,
3. Augmented Product
4. Potential Product.

It can be used to analyze a Product Strategy with reference to generic technical features, competition, customer expectations and the 3C's i.e. customer's customer, customer's competitor and customer's cost structure.

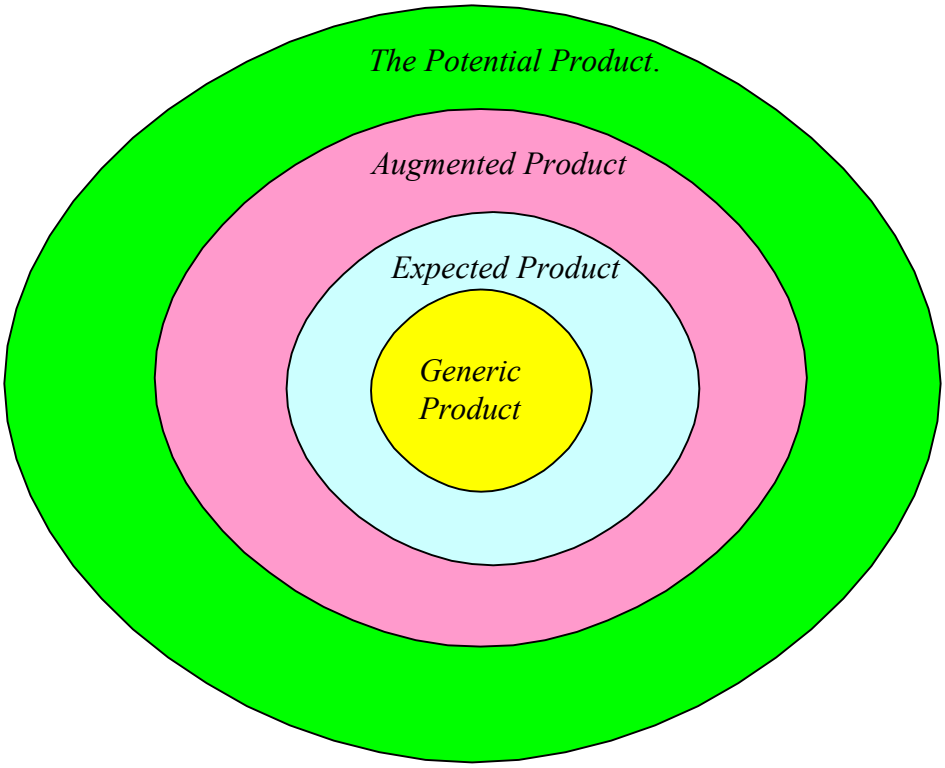


Figure 3. The Whole Product Concept

The Generic Produc echnology that is needed for market participation e.g. Integrated Circuits for the semiconductor industry. It is of particular importance to Engineering, who tend to think that the Generic Product is everything that is needed for market success. However, the Generic product is only a small piece of the puzzle. The Expected Product represents the customer's minimal conditions and is determined by competitors. e.g. Product Data sheets for Integrated Circuits, Reference Designs for Microprocessors. The Augmented Product involves product features and attributes that exceed the normal buyer expectations and the competitor offerings, by augmenting the product with features that the customer has never thought about. eg. Application software for microprocessors and continuously differentiated features. The Potential Product involves everything that can be done to attract and hold customers by taking into consideration the Customer's customer, competitor and cost structure. eg. 'Intel Inside' campaign, retail channel clout, co-marketing and sales/service campaigns. Thus the Whole Product Concept holistically links technical features of the product with the market considerations needed for a successful launch. By providing a forum that focuses the entire product launch team on the Whole Product Concept can also help alleviate Engineering / Marketing interface issues.

Linking The Technology Adoption Lifecycle Landscape with the Whole Product Concept

The following figure illustrates the link between the Technology Adoption Lifecycle Landscape with the Whole Product Concept.[7]

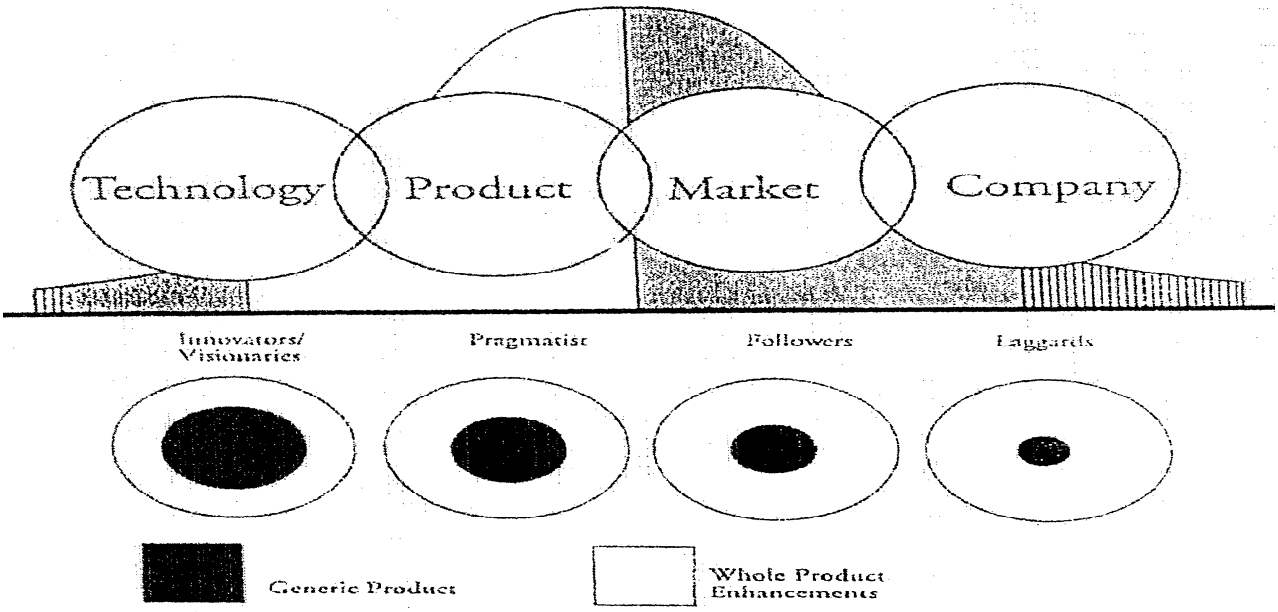


Figure 4. Relationship Between Technology Adoption Lifecycle and Whole Product Concept

With emphasis on innovative technology, the Generic Product plays an important role in appealing to innovators and early adopters. The importance of the Generic Product is diminished in the case of the pragmatists in the early majority stage which consists of the bowling alley, tornado and main street stages. Some of the Expected and Augmented Product attributes are a major determinant of success in this stage. For the followers in the late majority stage, the Augmented and Potential product features are major determinants of adoption and they are very munch influenced by market conditions. The Potential Product features and the company reputation are major factors of product adoption for the laggards in the late decline end of life stages.

Disruptive Technology Mapping

In developing a comprehensive high tech product marketing and technology strategy for start-ups, one must be very cognizant and anticipative of Disruptive Technologies.

Disruptive Technologies are seemingly irrelevant, inferior technologies which are developed independent of the dominant incumbent sustaining technologies. When a disruptive technology meets the performance demands of mainstream customers, the customers will switch to it even if it is inferior to the sustaining technology.[8,9,10] Disruptive Technologies can be powerful sources of new product or business ideas for High Tech entrepreneurs. The Disruptive Technologies concept could also be an effective tool for determining the potential competitive products and substitute technologies.

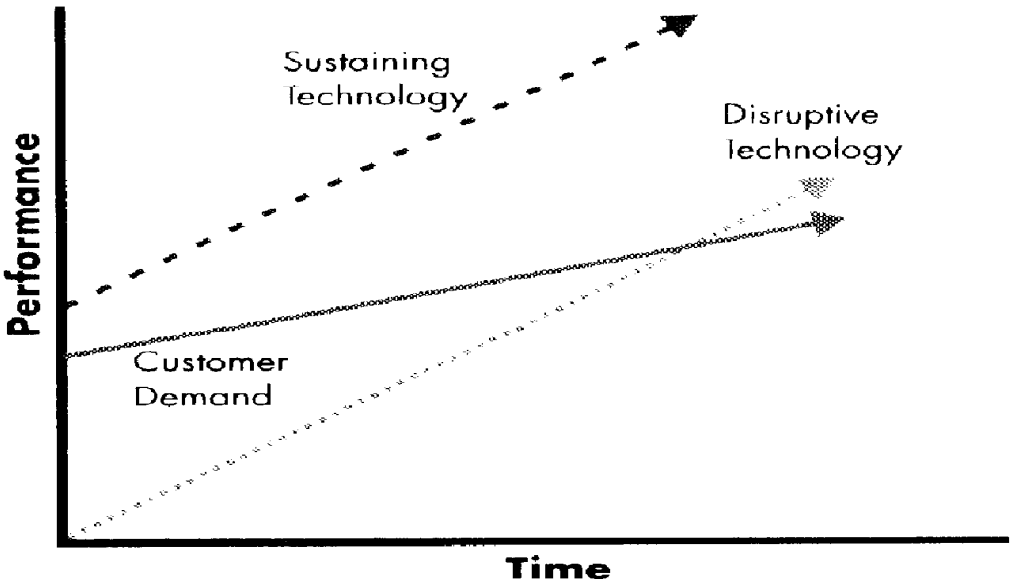


Figure 5. Disruptive Technology Mapping

According to Prof. Clayton Christensen, a fatal threat to the dominant incumbent company's market share can begin as a low-quality, low-margin product that current customers do not want and cannot use- yet. If these disruptive technologies are ignored, and they just may grow in capability to meet mainstream needs.

Such upstart technologies should be on the radar screen of both established companies and budding entrepreneurs because a disruptive technology can quickly develop into a competitive threat, dramatically transforming the marketplace. No industry is immune- particularly in today's

wired environment.

The rational, analytical processes of most well-managed businesses push them to meet their current customers' needs and invest in the sustaining technologies that their customers want today. When these customers reject a new technology, product concept, or way of doing business, however, established companies have little incentive to pursue it. Sailing ship companies, disk drive manufacturers, and integrated steel companies have all learned the hard way that ignoring seemingly irrelevant, inferior technologies can cost a company significant market share, or their entire business, in the long run.

Typically, the disruptive technologies that damage an established company have three important characteristics:

- They present new benefits that enable new applications for new customers.
- Their initial performance doesn't meet the demands of current customers.
- Their performance is improving rapidly.

When new technologies improve so that they do meet the needs of mainstream customers, sales surge because these customers suddenly want the product and its unique benefits. Start-up companies that have nurtured the technology and markets are now poised to be industry leaders.

To successfully market and develop new technologies, marketing strategists must be able to:

- Determine if the technology is sustaining or disruptive
- Define the strategic significance of the disruptive technology
- Locate an initial market for the disruptive technology
- Protect it from business processes geared to serve established customers
- Maintain the disruptive technology's distance from the central organization over time

Using the Disruptive Technologies Concept for Strategic Planning

Mapping future customer demands over time (typically 5 years) provides a standard for evaluating disruptive technologies. To determine whether a technology is disruptive or sustaining, ask the right people the right questions to define the strategic significance of the new technology. Plot a simple graph of the product performance as it is defined in mainstream markets on the vertical axis versus time on the horizontal axis. This graph can also help marketing strategists identify both the right questions and the right people to ask these questions (customers – technology users or suppliers – technology developers). First, plot the sustaining technology performance curve. Next, draw a line depicting the level of performance and the trajectory of performance improvement that customers have historically enjoyed and are likely to expect in the future. Then, locate the initial performance level of the new technology. If the technology is disruptive, the point will lie far below the performance demanded by the current customers. The slopes of the curves of the customer demand and the disruptive technology are also very critical. If knowledgeable technologists believe that the new technology might progress faster than the market's demand for performance improvement, then that technology, which does not meet the customers' needs today, may very well address them tomorrow. The new technology, therefore, is strategically critical.

Conclusions

In this paper we have reviewed four strategic analysis tools that are becoming increasingly important in developing high tech product marketing strategies. The Whole Product Concept provides a concise, holistic tool linking the technical features of a product with market considerations to develop a successful product strategy. While the BCG Model, The Technology Adoption Lifecycle and the Whole Product Concept are interrelated and focus on evolutionary product and technology cycles, Disruptive Technologies can result in a product going from the Question Mark quadrant (innovation, early adopter stage) to a Dog quadrant (decline, end of life stage) by never making its way out of the chasm. Disruptive Technologies Mapping enables the high tech entrepreneur and marketing strategist to be cognizant and anticipative of these seemingly inferior technologies that may meet the demands of mainstream customers and displace the incumbent sustaining technologies. Disruptive Technologies Mapping also helps high tech entrepreneurs recognize new venture opportunities and test the potential of these versus the incumbent competition. Hence it is critically important to use these contemporary tools along with conventional methods, when developing marketing strategies for innovative high tech products and technologies.

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