

THE ROLE OF TECHNOLOGY AS A COMPETITIVE WEAPON IN EACH OF THE FIVE PHASES OF GROWTH

Maria Imelda R. Hizon
CGI

James W. Bronson
University of Wisconsin-Whitewater
Department of Management
800 West Main Street
Whitewater, WI 53190-1790
Tel: (262) 472-5456
Fax: (262) 472-4863
bronsonj@uww.edu

William L. Dougan
University of Wisconsin-Whitewater

Abstract

An entrepreneurial firm may start with a competitive advantage that may, or may not, be technology based; however, the firm must eventually employ competitive technology in order to survive in its industry. To grow and prosper, both practitioner and academics recognize that a firm must repeat the technology adoption decision as it transitions through the different stages of its life cycle. An examination of five growth stages suggests that technologies may maximize competitive advantage as the result of the firm's ability to attract both capital and customers. Segments of relatively smooth growth, bounded by periods of rapid change and upheaval or revolution, are apparent when the life cycle of most firms is graphed. In order to be the most effective, firms should strive to implement pertinent new technologies during the periods of revolution in the growth curve. This paper demonstrates how an entrepreneur can leverage appropriate technology in each phase of a firm's development as one component of competitive advantage. Over the life cycle of the firm, technology should facilitate: flexibility in product and service development and quality in the early stages; the management of complex operations in the middle stages; and both the consolidation and expansion of activities in the later stages. Thus, the adoption of appropriate technology keeps the company aware of the latest developments, helps it adapt to changing markets, and protects it from obsolescence.

INTRODUCTION

Why do some entrepreneurial firms prosper throughout the life cycle of their business while other firms drop out of competition? For over thirty years, a number of perspectives on the growth of the firm have tried to address this question (Greiner, 1972; Churchill and Lewis, 1983; Tushman, Newman, and Romanelli, 1986; Hansen, 1998, 1999). According to these perspectives, each phase of the business life cycle requires that the company master new competencies and utilize the most appropriate forms of technology. The company follows this approach with the intent of renewing its competitive advantage. In so doing the company guards itself from obsolescence or ossification by offering, processes, systems, products, or services not previously observed in a market. As a result, at each stage of its evolution, the company experiences positive feedback in market demands, profits, growth and cooperative ventures.

For the most part, these perspectives have failed to explicitly recognize the importance of technology and technological innovation in the success or failure of a firm. They do not reveal how the entrepreneur accepts the risk of determining the most efficient and effective forms of technology to adopt. The right technology decisions will help sustain the company's competitive advantage at each stage of the life cycle of the business, while the wrong decision may have the opposite effect.

This paper is an attempt to identify the most appropriate times for an entrepreneur to introduce innovative technology solutions into a developing company. To this end, noted growth models are reviewed and compared in the ensuing discussion to emphasize their congruence, commonality and evolutionary development. In addition, this paper demonstrates how an entrepreneur can leverage appropriate technology in each phase of a company's development to earn superior profits and promote continued growth.

Technology Adoption as a Distinctive Competency

Distinctive competencies are the company's ensemble of skills and knowledge that are built on specialized expertise and tangible and intangible endowments that other competitors do not possess and cannot readily acquire or replicate. Armed with these distinctive competencies, company management chooses to methodically adopt a low-cost and/or differentiation strategy by developing its processes, systems, products, and services in order to distinguish the company from its competitors. Differentiation can take the form of a unique product, higher quality, customized service, personal relationship, and/or an improved defensive position. Such strategic action gives the company an advantage over its rivals in buyer-seller transactions. If this advantage is sustainable over some narrow range, it is the basis for a business.

Employing relevant technology, the entrepreneur must grow her/his customer base by further penetrating, or by broadening, the initial foothold in the market. Moreover, he/she must supply existing customer, and attract potential new customers, by providing value equivalent to, or better than, the value offered by competitors. During this period, the company can employ new technology, which can and make the growing company a world leader in developing distinctive competencies as an effective strategy for establishing a sustainable competitive advantage. By

the time competitors can recognize the impact of these technologies and react to them, the company can develop and adopt the next generation of technological improvements. Thus the adoption of technology keeps the company abreast of the latest developments, helps it adapt to changing markets, and protects it from obsolescence. This process must be successfully repeated over the life cycle of the firm.

Technology, Growth Curve, and Theories on the Five Stages of Growth

The growth curve is characterized by alternating periods of revolution and evolution in a company's development. The general slope of the curve is dependent on the growth rate of the industry in which the company competes. Failures in introducing new technology can usually be rectified while only delaying - but still preserving - the growth curve. In this event, costs incurred in developing technology that is subsequently abandoned can diminish available resources, but have only a temporary effect on future returns. Only if the new technology requires an irreversible commitment is the dissolution of the company truly a risk.

A number of authors (e.g., Greiner, 1972; Churchill and Lewis, 1983; Tushman, Newman, and Romanelli, 1996; Hansen 1998, 1999) have concerned themselves with issues related to the growth curves of firms. Central to the discussion of technological adoption is the phenomenon known as "punctuated equilibrium" (Tushman, Newman, and Romanelli, 1996), which describes the non-continuous development of systems. If the growth cycle of most organizations is graphed, one will see periods of relatively smooth growth bounded by periods of rapid change and upheaval. The curve can also be characterized as a "step curve," which occurs as resources are added or reformulated to induce the next level of relatively smooth growth.

Congruent with the step curve model of growth, management theorists (e.g., Greiner, 1972; Churchill and Lewis, 1983; Hansen, 1998 and Hansen, 1999) argue that there are five stages of growth experienced in the life of a successful business. No single model claims to be comprehensive. However, all of the models presented emphasize the fact that each of the five transition periods that bound these stages is itself a period of management change and resource restructuring undertaken to better support anticipated conditions in the next level of business. Each model examines some aspects of the organizational structure, management type, business requirements, capabilities, strengths, opportunities and limitations that affect the performance and success of a company at each phase of its development. All theories contend that every evolutionary period is characterized by the dominant management style used to achieve growth, while each revolutionary period is defined by an enterprise-threatening management problem that must be solved before growth can continue. Thus, each period is both an effect of the previous phase and a cause for the next phase. Each successive theory progressively models a more mature description of the characteristics and requirements of an evolving organization, and implies the need for adopting appropriate, effective and efficient forms of technology to assure continuity and growth.

Moreover, each model is founded on the basic principles explored by Greiner (1972) in his theory of organizational growth. Greiner's (1972) analysis suggested five key dimensions essential for building a model of organization development. These are the age of the organization, the size of the organization, the current stage of evolution, the present phase of

revolution, and the growth rate of the industry. As each of these dimensions evolves in a unique state of circumstances prescribed by past experience and practices, they resolve to form the growth curve that is singular for a particular company.

Like Greiner, Churchill and Lewis (1983) developed a method to depict a different mix of management factors required for each stage. The changing role of the factors clearly illustrates the need for owner flexibility and entrepreneurial strategy.

Fifteen years after “The Five Stages of Growth,” Hansen (1998) published his thesis, which states that the periods of revolution are engendered because the management structure necessary to foster success in a particular stage becomes an obstacle to further growth. Hansen modernizes the models set by Greiner (1972) and Churchill and Lewis (1983) to reflect current trends in business and the market opportunities for small companies. Hansen posits that after a company progresses through the first two growth stages, individual business conditions and opportunities will dictate if the company experiences none, one or two of the subsequent phases. As Hansen explains, most companies constantly strive to differentiate themselves in order to protect themselves from the commodity pricing that occurs in the economists’ perfectly competitive market. As a result, most markets are not perfectly competitive and individual business conditions can affect the company’s ability to seize a timely market opportunity. Yielding or seizing such a break can, in turn, affect the company’s chance to marshal resources to prepare it for the next market opportunity.

The similarities among these various positions are pervasive. Most of their differences can be attributed to the evolutionary and revolutionary processes, and the varying perspectives examined by the individual authors. The entrepreneur must consider and understand the effects of these stages of growth to optimize the impact when new technologies are introduced.

Need for Growing Technological Competence

It is imperative for organizations to be able to adopt technologies that can sustain competitive advantage in today’s global economy. Investors and lenders both recognize and reward those companies that demonstrate proficiency in technological disciplines (Montgomery and Porter, 1991). Investors are aware that technology can produce dramatic productivity gains through the leveraging of skilled positions and enhanced processes. Investors also know that innovation can be more rapidly adopted, that product consistency and reliability can be more readily ensured, and that customer relations can be further enhanced by capable and timely application of technological knowledge.

If one accepts that competitive technology is important to ensure success in many industries, a number of questions arise. When is it best to introduce new technologies into the firm? Should one be an innovator, a close follower, a state-of-the-art practitioner, a laggard, or a late adopter? (McGrath and MacMillan, 2000). Kevin Kelly’s (1998) position implies that one should introduce new technologies for maximum effect, not necessarily for maximum efficiency. In order to be the most effective, organizations should strive to implement pertinent new technologies during the periods of revolution in the growth curve. However, the experience curve may play a far more significant role in low-cost than differentiation. Kelly is implicitly

acknowledging that differentiation is often dependent upon the ability to induce short-term monopoly rents through constant product introduction and enhancement, while low-cost is far more dependent on factors like the experience curve, economies of scale and continuing improvements in cost containment for products that tend to be commodity-like. Although differentiation and low-cost strategies are not mutually exclusive, the present study focuses on the need to differentiate to achieve maximum effectiveness.

Based on a differentiation strategy, during a revolutionary phase, firms should adopt those technological competencies that will yield advantages that can be readily perceived by potential customers; customers who will make the purchases to fuel the next period of evolution. Ongoing change will continue to bring other innovative technologies to the fore to be exploited by the entrepreneur. Adopting Hansen's (1998) terminology for the five phases of growth, the following technologies may be appropriate for each growth phase:

Phase 1 - Concept Development: Internet and related information and communications technologies; innovative products and services; and customer relationship management system.

Phase 2 - Foundation Building: e-Business innovation; enterprise resource planning system; digital network for greater interface; global connectivity; and Quality management.

Phase 3 - Rapid Market Expansion: integrated global network systems; fiber-optic and bandwidth technologies; globally managed service models; multi-vendor support system; single-source managed services; and network outsourcing.

Phase 4 - Market Stabilization: enterprise management system; lean manufacturing techniques; and extensive product differentiation research and implementation.

Phase 5 - Niche Development: virtual organizational structure and management; strategic collaborations through joint ventures, mergers and acquisitions; data warehousing system; online analytical processing system; and portfolio management system.

The Role of Technology in the Concept Development Phase. Convincing potential customers that the company can deliver a unique product/service that better serves their needs will create a means for the company to enter the marketplace. Technology introduced at the development stage should focus on market intelligence and flexibility so the company can leverage its competitive edge by identifying and meeting previously unmet customer needs. At this phase of uncertainty, the entrepreneur must be flexible and creative in adapting appropriate technologies that will adjust products, processes, marketing strategies, services, and other systems to establish a record of customer satisfaction. During the Concept Development Phase, products, production rates, and service packages are frequently adjusted or refined. Technology expenditures should be kept modest and applied to improving fundamental production and business processes because resources are scarce at this stage and the frequency of product, output and services change is typically the highest.

The Role of Technology in the Foundation Building Phase. At this point, the company has established the basis for a competitive advantage. It has developed a product/service mix that is rewarded in the market place. It now has to establish a reputation for consistency in executing the key strategies for the industry. This will allow the company to defend its advantage and to shelter itself from excessive costs as it pursues additional customers. It must then develop the products, processes, and systems that will provide the additional capacity required allowing the

company to enter into the next phase. To accomplish this task, the appropriate technologies to be introduced at this phase must focus on the processes that will consistently produce a high quality product as defined in the Concept Development Phase. Concurrently, the product must be supported with an organization that is recognized by customers. The company must identify target markets and deliver products that inspire confidence among present and potential customers. Also, the organization must employ innovative technology that will: produce a discernable competitive advantage, differentiate the customer's "buying experience" at any point in the transaction, support product proliferation and the rapid increase in the number of customers arising out of growth, and control operations and to support inter-company and intra-company communications at multiple levels. It must provide a level of quality, price, and customer service that will keep present clients and attract new customers. However, the company's inability to adopt the most strategic and appropriate technology at this phase of its business life cycle can have some significant consequences. Including the loss of competitive advantage and the erosion of the company's position in the industry. The potential for such setbacks should not discourage the company from pursuing a different set of strategies and adopting new technologies. With adequate, planned and strategic adjustments, a company can rectify its position to continue its intended growth path.

The Role of Technology in the Rapid Market Expansion Phase. The core of technology in this phase is a continuation of the focus begun in the previous phase. Management efforts are consumed with concern for control and growth. Technological innovations must be directed toward enabling low-level employees to make day-to-day quality operating decisions. Increasing sales volumes effect learning and simultaneously offer the opportunity to realize economies of scale. The combined influences of these two factors can increase the rewards gained beyond the additive sum of the individual effects if the firm applies new technologies to the improvement of products, processes, controls, and communications. These technologies are mainly expansions and upgrades of the systems adopted in the Foundation Building Phase. They evolve to promote delegation and specialization opportunities afforded by the higher volumes. These technologies earn profit premiums for those organizations that employ them. A portion of these profit premiums can be reinvested to preserve the company's position as a technological leader. This cycle can continue until the market reaches a new equilibrium, the Market Stabilization Phase.

The Role of Technology in the Market Stabilization Phase. The company does not have to dominate the market with its technology strategy in the Market Stabilization Phase. Acceptable profits can be reached through distinctive products and services, and/or cost advantages obtained while employing superior technology executed by highly trained specialists. In the Market Stabilization Phase, the company should continue to invest in making continuous improvements to preserve its share of discriminating customers and to search for new opportunities for investment. Blindly pursuing greater market share can direct a leading edge technology company into a "race to the bottom." The "bottom" is defined as "average market returns." This occurs because, once the company has attracted those customers willing to reward innovative technology, its marginal sales must come from those customers who do not strongly value the enhanced benefits of the new technology and who are only willing to pay average or near average prices or those customers who do not offer the opportunity to realize cost reduction opportunities. Under these conditions, the seller cannot earn premiums sufficient to allow it to continue to make the investment necessary to sustain its technological leadership. In order to

earn sufficient profit premiums and sustain growth, the company needs to seek out niches where the market will reward it for technological leadership. With investments in multiple and sophisticated technologies, it is time for the company to focus attention on consolidating all the experiences, tools, skills and information acquired throughout its development stages.

The Role of Technology in the Niche Development Phase The advantage to a firm that has followed the path described in this paper is that it may now have developed distinctive competence as a technology innovator. This may give it a reputation for innovation and an advantage both in product and capital markets. The firm that reaches this phase has license to transcend the limits of the original market in which it earned its reputation and to explore companion markets served by companion technologies. For the most daring entrepreneur, this is the time to consider global operations and expanded offerings. The company must reach some practical limit in the amount of business it can control and manage, so it must direct itself to those activities that create an optimal mix of long-range opportunity and current revenue. This requirement engenders a new technology that can enhance the organization's ability to examine the market for potentially profitable investment and divestment opportunities. Building a profitable unit and selling it to another firm better situated to manage it can produce funds that can be better spent to develop products that fit the long-range goals of the company. Conversely, a unit that meets neither profit nor strategic goals can be sold at an attractive price to a company better situated to exploit the opportunity, or it can simply cut company losses and divest a poorly performing unit at the best obtainable price.

CONCLUSION

The purpose of this paper has been to emphasize the advantage of adopting appropriate innovative technology as a competitive weapon and to describe the need to incorporate it into the strategy of a growing company. An entrepreneur can begin by creating a firm with a competitive edge that may, or may not, be technology based, but the firm must eventually employ some form of leading edge technology to establish its ability to perform key strategic actions necessary for survival in the industry. Establishing a distinctive competence in innovative technology can be important to maximizing the growth potential of a company. If the company is generally perceived as successful at using new technology as a way of obtaining a sustainable competitive advantage, the firm can readily attract both capital and customers. The strategy of adopting relevant innovative technology at each phase of the life cycle of a business to achieve strategic competitive advantages is not as high-risk as it seems at first consideration. As the company expands, it must develop new capabilities to address the requirements and risks associated with each development phase. Introducing innovative technology to be a market leader incurs only the marginal cost and risk associated with employing advanced technology. The reward of taking the risk is thus to produce a sustainable competitive advantage that can ensure the future competitiveness, growth and sustainability of the entrepreneurial company.

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