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The core competency model in acquisition strategy development of the small and midsize environmental technology company

Leslie Ann Jensen
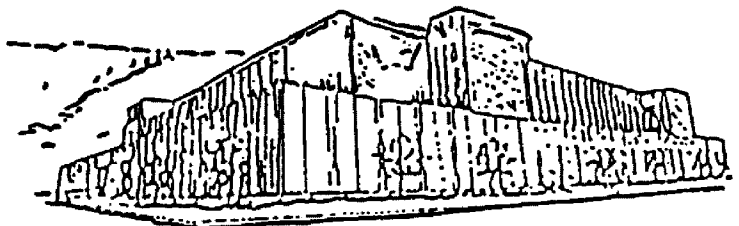*The University of Montana*

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The Core Competency Model in Acquisition Strategy Development of the Small and Midsize Environmental Technology Company

By

Leslie Ann Jensen

B.S. The University of Montana, 1984

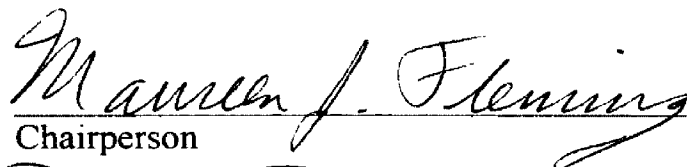Presented in partial fulfillment of the requirements for the degree of
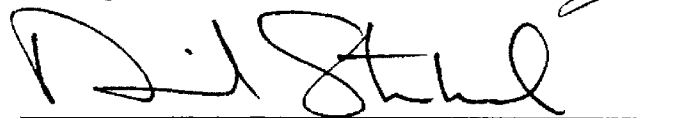
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Public concern for the environment initiated the environmental industry. Increasing public awareness and pressure for a cleaner environment resulted in numerous pieces of anti pollution legislation being passed during the 1970's and 1980's. A regulatory agency, the Environmental Protection Agency was established in 1971 to implement new laws and to supervise mandated cleanup efforts.

Federal government research and development contracts enabled scientists and engineers to begin working on solutions to existing and potential environmental problems. Companies formed to combine technology with engineering services to meet the demand for environmental remediation. The ongoing regulatory market and increasing awareness of the health effects of pollution supported growth of the industry to over \$178 billion by the end of 1996. However, almost 30 years after the first Earth Day in 1970, the market for environmental technologies and related services has started to mature. As a result, the industry is consolidating into fewer companies.

As an industry matures, competitive advantage typically falls to large companies. This phenomenon drives industry consolidation and thus small and midsize environmental technologies companies will be at an increasing competitive disadvantage. Acquisitions are viewed as a viable growth tool. However, acquisition success will require a carefully planned acquisition strategy.

This paper develops a framework for incorporating acquisitions as a part of a competitive strategy for small and midsize environmental technologies companies. The framework is based on the Core Competency model of competitive strategy that evolved during the 1990's. The primary purposes of the paper are to describe the competency model as it has evolved during the last decade and to suggest how small and midsize environmental technologies companies may use the model as a tool for devising an acquisition strategy.

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Chapter I. Introduction

History of the Environmental Industry

The environmental industry got its start in the 1960's and 1970's as public concern for the environment gained momentum. The huge success of the first Earth Day in 1970 commemorated mainstream America's demand for clean land, air, and water. Perhaps even more memorable is the "keep America Beautiful" campaign in which a Native American man paddles his canoe along the shore of a polluted lake —a single tear sliding down his face to mark his grief. Increasing public awareness and pressure for a cleaner environment sparked federal anti pollution legislation including the:

- Clean Air Act of 1970,

- Water Pollution Control Act of 1972,

- Resources Conservation and Recovery and Toxic Substances Control Acts of 1976,

- Comprehensive Environmental Response, Compensation and Liability Act of 1980 and,

- Superfund Amendments and Reauthorization Act of 1986.

The Environmental Protection Agency (EPA) was established in 1971 to shepherd new regulatory controls and to supervise mandated cleanup efforts.

With the assistance of federal government research and development contracts, scientists and engineers began working on ways to remediate existing environmental problems and preclude new ones. The need for consultants and contractors to evaluate and perform

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cleanup work created opportunity for companies formed to combine technologies with engineering services to solve environmental problems. Increasing regulatory control, growing understanding of the health effects of substances such as DDT, heavy metals, arsenic and radiation, and changing technology that introduced new problems as quickly as old ones were resolved generated steady growth in the industry over the past 25-30 years. As a result, the environmental technologies and services industry grew to over $178 billion by the end of 1996.[1]

Current Industry Situation

Now, the market for environmental technologies and related services is beginning to mature. Growth rates of 10% to15% per year from 1985 to 1991 have slowed to 1% to 5% per year.[2] No major pieces of environmental legislation have been passed into law since the 1980's and public concern for the environment has eased. The industry's movement to the mature market phase is further illustrated by reductions in federal contracts, increases in globalization, and development of market niches. The effect of the maturation factors outlined is consolidation of the industry into fewer companies.

As the number of companies in the industry shrinks, small and midsize environmental technologies companies will be at an increasing competitive disadvantage. If such companies are to survive, they must go beyond internal growth and use acquisitions as a growth tool. However, success in the acquisition arena for inexperienced and resource-limited companies will require a carefully planned acquisition strategy. This paper

develops a framework for incorporating acquisitions as a part of a competitive strategy for small and midsize environmental technologies companies. The framework is based on the Core Competency model of competitive strategy that evolved during the 1990's. Subsequent chapters:

- Define small and midsize environmental companies and describe the current environmental technologies and services market,

- Describe the competency model as it has evolved during the last decade,

- Suggest how small and midsize environmental technologies companies may use the model as a tool for devising an acquisition strategy, and

- Highlight the importance of a strategic architecture to the success of the competency model.

The goals of this paper are to provide an understanding of the core competency model, emphasize the value of the model to acquisition strategy development for small and midsize environmental companies, and to provide such companies with practical guidelines for the competency model's implementation.

Chapter II. Small and Midsize Environmental Companies and Acquisition Strategy

The Definition of a Small or Midsize Company

Company size impacts acquisition strategy. Companies such as Boeing or Scientific Applications International Corporation (SAIC)[3] have extensive experience in the acquisitions arena. They develop skills internally and assign specific staff to identify and evaluate acquisition candidates. In addition, a stronger financial base, including access to capital, allows these firms to make mistakes and take risks that could put a small company out of business.

In order to differentiate small and midsize companies from large firms and to provide a consistent frame of reference, two classification systems are used. The Small Business Administration (SBA) system is relevant because federal contracts typically make up a substantial portion of sales.[4] However, merger and acquisitions (M&A) intermediaries do not use the SBA system; many companies classified as small business by the SBA would be termed midsize or even large companies by M&A intermediaries. The size standards used in the M&A industry are important since acquisition strategy is the goal.[5] Combining the two systems encompasses the companies addressed in this paper. Therefore, the definition of small and midsize companies will include those with:

1. more than $1 million but less than $50 million in sales, and

2. More than 10 but fewer than 500 employees.

The smallest end of the spectrum, under $1million in sales or fewer than 10 employees, is excluded. In most instances, the talent or technology in those companies could be hired

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or purchased separately from the company itself. The small and midsize definition covers the majority of environmental engineering and technology companies in existence. These are the companies most likely to be involved in acquisition and merger activities.

The Environmental Technologies and Services Market and Industry

The industry that began with the authorization of the Environmental Protection Agency in 1971 is entering the mature market stage. A shrinking and increasingly competitive federal and state government procurement market evidences this. Environmental consulting and remediation revenues from the federal cleanup market have slipped over the past several years. Company size is viewed as a key factor in being the successful bidder on the decreasing number of contracts available. While growth in the industry has occurred in the private sector, competition for these private revenue dollars is intense.[6] The largest contractors with a broad range of capabilities are best positioned to compete. Companies seeking competitive advantage in this environment have used consolidation to gain size and reduce the number of competitors.

Another effect of a maturing market, increasing globalization also contributes to industry consolidation. Demand for environmental engineering and technologies is accelerating overseas as developing countries begin to invest in environmental infrastructure. Opportunities arising in developing countries tend to be large-scale infrastructure projects. These projects are underwritten by organizations such as the World Bank, the Inter-American Development Bank, and the Asian Development Bank. The attention of

these funders is typically focused on the largest of the environmental contractors such as Bechtel Group and Science Applications International. Federal government attempts to support small business by reserving a portion of contract dollars available (known as contract set-asides) have had limited success.

Niche markets created in the maturation process include 1. Design-build-operate and 2. Risk-based cleanup. These markets will generate competitive advantage for firms large enough to have the broad range of skills required. For instance, the water-wastewater market is moving toward design-build and design-build-operate systems. Earth Tech, one of the 20 largest environmental firms in the nation, is attempting to capitalize on this movement. In 1998, Earth Tech acquired similarly sized Rust Environmental and Infrastructure.[7] The purpose of the acquisition was to gain the size and capabilities required to compete effectively in the emerging design-build-operate market. In the regulated cleanup market, cost and improved health-risk data have spurred a movement toward risk-based cleanup. The goal of risk-based cleanup is to reach an acceptable risk level versus 100% cleanup. This movement is creating a niche market for risk assessment services. Companies ready to meet demand for risk assessment services can offset shrinkage in the remediation services market.

As a result of maturation factors, the industry consolidation, which has been intensifying for several years, is anticipated to accelerate. Consolidation has already reduced the number of competitors for federal contracts. The president of one top ten firm predicts

reduction from the current ten or more to two or three major players in the Department of

Energy contract market.[8] In this environment, small and midsize companies must grow

quickly and strategically in order to build their competitive advantage.

Acquisition as a Growth/Competitive Strategy

Gaining sufficient scale to consistently attract capital and win bids in the government and

private sectors are viable reasons for acquisition. The opportunity to acquire relevant

technologies is another reason. Technologies tend to have a lengthy development,

testing, and proving period. However, the increasing pace of technological change

encourages speed and agility in the lab-to-market process. In addition, there are

numerous technologies in various stages of development, adding impetus to acquiring

existing technologies versus starting at the drawing board.

Less obvious but more compelling for small and midsize companies are the goals of

acquiring competencies currently lacking and building existing competencies. Strategic

acquisitions — that is, those undertaken as part of an overall competitive strategy —

increasingly assess the potential to purchase core competencies in the evaluation of

acquisition candidates.[9] Many small and midsize environmental companies are primarily

government-contract research and development firms or technology-transfer spin-offs.[10]

To capitalize on emerging markets like design-build-operate and risk-based cleanup, such

companies may need to add competencies in construction, facilities management, and

risk assessment. In addition, acquiring a company with private sector marketing and

business development competencies could enhance their ability to grow. This type of acquisition may also support the identification and development of commercially viable products and services.

If small and midsize companies are to grow in part by acquiring other companies, they need a well-designed acquisition strategy. The potential for success in integrating an acquisition is limited if the purpose and expectations of the acquisition are not defined and articulated. The core competency model provides a framework for the development of acquisition strategy for small and midsize environmental technologies firms. The model enables a company to view each potential acquisition in terms of how it supports the overall competitive strategy. It systematizes the organization's growth strategy. It also allows for subsequent evaluation of the success of the acquisition that goes beyond measuring the success of revenue and income projections.

Chapter III. The evolution of the Core Competency Model and its Contributors

The core competency model evolved in the 1990's based on successes and failures being noted in the corporate world. It appeared that competitive strategy of the previous decade was showing signs of wear. Companies highly successful in the 1970's and first half of the 1980's were losing competitive advantage to innovative, aggressive competitors that seemed to come out of nowhere. Their curiosity piqued, management academics and business consultants examined these companies to pinpoint the key drivers of their success or failure. As a result of that examination, a transition in competitive strategy was identified and a body of work analyzing that transition arose.

Three successive articles made significant contributions to competency theory as it currently exists. In 1990, C. K. Prahalad and Gary Hamel re-birthed the importance of internal variables with the publication of "The Core Competence of the Corporation" in the *Harvard Business Review*.[11] In 1992, George Stalk, Philip Evans, and Lawrence E. Shulman added to that work with "Competing on Capabilities: The New rules of Corporate Strategy". This article contributed significantly to the competency definition.[12] Finally, 1995 brought David J. Collis and Cynthia A. Montgomery's "Competing on Resources: Strategy in the 1990's".[13] The article stressed the interplay between internal resources and the external competitive environment. It also provided a series of tests to evaluate competencies that substantially expanded on the prior work of Prahalad and Hamel. This chapter synthesizes those three primary contributions to competency theory, defining the fundamental concepts and critical issues.

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Competitive Strategy of the 1980's Versus the New Competitive Strategy

As the 1980's drew to a close, it was apparent that externally oriented, product and market-based corporate strategies would not continue to generate competitive advantage. For much of the prior two decades, competition was based on longer product life cycles, readily defined and targeted markets, and easily identified competitors. Therefore, competition was a game of market "position", with market share the scorecard.[14] By the end of the 1980's, increasing market fragmentation, shifting market boundaries, and globalization made capturing any particular market difficult and transitory. This reduced the value of market segments. At the same time, improved customer sophistication and the speed of technological progress shortened product life cycles. This reduced the value of product segments. These changes in the external competitive environment called for a new competitive strategy.

The progenitors of competency theory identified this transition. A prior focus on external products and markets shifted to a focus on the internally generated "competencies" needed to anticipate and meet emerging customer demands. Thus, the concept of core competencies as a competitive strategy evolved. This strategy calls for radical change in how organizations are designed and how they function. Companies that build competitive advantage will have the ability to envision what customers will want and need in the future. They will enter emerging markets with speed and agility and rapidly innovate to meet strategic, customer-driven criteria.

Defining Core Competencies

Because concept of core competency is somewhat abstract, it is described using both definition and example. Based on a synthesis of the literature, competencies can best be defined in three basic categories:

1. *Technical Competencies* - Distinctive sets of technologies and production skills combined to generate end products[15],

2. *Business Process Competencies* - Business systems and processes developed strategically to deliver value to the customer,[16]

3. *Cultural Competencies* - Tendencies or behaviors within the organizational culture that support learning, innovation, responsiveness to customer demands and cross-functional collaboration.[17]

Technical Competencies

Technical competencies are the result of coordinating diverse production skills and multiple technologies.[18] These competencies involve the integration of the experiences and skills of individuals within the organization and the various technologies that the company utilizes in manufacturing a product or providing a service. Technical competencies focus on the end products that result from the unique and strategic combination of competencies.

For example, Sony's miniaturization competency consists of materials and electronics technologies, creative engineers and marketers, and high quality production skills. The

competency generates a continuous stream of innovative consumer products. Sony's competitive advantage is sustained by the ongoing introduction of first-to-market, high quality consumer electronics that competitors can only replicate.

Lessons to Learn From: NEC and GTE

In the early 1980's, GTE and NEC were companies with similar business and technological bases. However, GTE was already involved in telecommunications and had the technology and skill set needed to dive into the emerging information technology industry. In addition, GTE was two and a half times bigger than NEC. Yet by 1988, GTE's sales had not yet doubled while NEC's sales had eclipsed GTE's by growing sevenfold. In fact, NEC was the only company in the world to be in the top five in revenue in telecommunications, semiconductors, and mainframe computers.

The distinction in how NEC and GTE grew — as a portfolio of competencies versus a portfolio of businesses — drove the increasing competitive gap between them. NEC looked to the future and envisioned a "convergence of computing and communications". Management analyzed what technical competencies the company would need to build competitive advantage in this up-and-coming industry. A committee of top managers was responsible for nurturing the development of the identified required competencies. In addition, the company allocated substantial resources to develop or acquire competencies, focusing not on immediate profit enhancement but on where they ultimately wanted to go.

Business Process Competencies

Unique business processes, systems, and behaviors combined in strategic ways to meet customer demand become business process competencies. Whereas technical competencies generate end products, business process competencies generate product/service features and benefits. Business process competencies are difficult to imitate because both the components and the process design are unique.[19]

For instance, Ernest & Julio Gallo Winery is the largest winery in the world because of business processes competencies that take their product from grape to table. Traditional craftsmanship is combined with state-of-the-art wine-making techniques to produce reasonably priced and consistent product. The winery is an industry leader in advertising and uses visually stunning television and print ads to create a "steeped in history" image of their wines. Finally, the company is highly vertically integrated and uses sophisticated information systems for global supply-chain management.

Lessons to Learn From: Wal-Mart and Kmart

In the early 1980's, Kmart was firmly ensconced as the leader in discount retail. Over 1800 stores and annual average gross sales of more than $7 million per store made Kmart the undisputed market leader and allowed for substantial economies of scale considered vital in the industry. Wal-Mart, on the other hand was a regional small fry with 229 stores that grossed half of what Kmart stores did on an annual average basis. By the end

of the 1980's, that picture had changed dramatically. Wal-Mart sustained supernormal growth rates over ten years, making it the largest and highest profit retailer in the world. Analysis of Wal-Mart's success reveals "interlocking strategic business decisions" that generate valuable business process competencies. The product features and benefits the company decided to capitalize on were best quality (including giving the customer what they wanted, when they wanted it) at the lowest prices. To create those features and benefits, inventory management had to become a business process competency. For the competency to be valuable, it had to provide a revolutionary level of just-in-time shipment of goods. Strategic decisions resulted from that analysis; the company invested in a truck fleet, invented a unique inventory control system called cross-docking[20] and developed information and management control systems that put decision-making in the hands of individual stores.[21] The inventory management competency is the vehicle by which Wal-Mart exceeds industry standards for quality, price and timeliness in the delivery of goods.

Cultural competencies

The most difficult of the three types of competencies to articulate, cultural competencies are "socially complex" combinations of leadership, relationships, attitudes, trust, and communication.[22] They are that certain "something" about a company that defy explanation and cannot be reverse engineered. Cultural competencies are the environment in which technical and business system competencies thrive. Some instances:

- 3M Company capitalizes on the creativity of its people by encouraging an experimental mindset and entrepreneurial risk-taking. This cultural competency spawns a superior level of product innovation.

- The organizational atmosphere created and sustained by 'transformational' leaders at Southwest Airlines and Wal-Mart embraces, invigorates, and motivates their employees. Exceptional service quality results.

- Hewlett Packard's unique environment of teamwork and cross-divisional collaboration allow for full use of technologies in production of disparate products. Product compatibility is generated as a unique and valuable benefit.

In these companies, cultural competencies are identified as significant in the creation of competitive advantage. These firms use cultural competencies to exploit their technical and business process competencies.[23]

Refining the Concept

Characteristics that help to refine the definition of competencies:[24]

1. Two central criteria apply to all three types of competencies:

   - Competencies are strategic in nature. Competitive advantage will accrue to the company that develops a "competitively distinct" set of competencies and puts them into play as part of an overall competitive strategy.[25]

   - Competencies must be customer driven. They contribute to the manufacture of products or the provision of services that customers want at a price they are willing to pay.

2. To qualify as competitively important, core competencies must be rare or distinctive. Advantage is not gained if many competitors have the same competencies. In addition, competencies must be valuable. Value is dependent on opportunity to exploit the competency. Finally, core competencies must be difficult for competitors to imitate quickly.

3. Core competencies develop and appreciate with use. They do not diminish like inventory or depreciate like equipment.

4. Incremental improvements in an organization's core competencies through a time continuum are what make them unique from those of other organizations.

5. Top management involvement and the free flow of information and people across business units and functions are absolute requirements for development of true core competencies.

The core competency model emerged as a result of real world competitive successes and failures analyzed in the early 1990's. The analysis led to a re-emphasis on evaluating variables internal to the organization in the formulation of competitive strategy. Three successive articles — "Core Competency", "Competing on Capabilities", and Competing on Resources" — made significant contributions to the development of this new competitive strategy. Those articles were synthesized in this chapter to provide an overall view of the evolution of competency theory to date. In the next chapter, guidelines for application of the competency model illustrate how to transform the model into a tool for developing an acquisition strategy.

Chapter IV. The Competency Model as a Tool for Acquisition Strategy Development.

In response to maturation of the industry, small and midsize environmental technologies companies have begun to view acquisitions as part of a competitive strategy. Acquisition allows for substantially faster growth. It can also enable companies to more rapidly fill competency gaps. Lack of experience and other resources make it imperative that these companies approach acquisition in a strategic and systematic way. The competency model accomplishes that goal.

The core competency model is ideal for several reasons. First, the model is built from the ground up. It starts with the foundation of the company and identifies gap areas or areas that need development. Second, the model stresses the interplay between the external and internal variables that factor into building sustainable competitive advantage. Finally, the model can be used as a tool in the acquisition strategy development process.

Applying the Model

Application of the competency model is an attempt to accurately answer these questions:

- What market opportunities will present themselves over the next five to ten years?

- What competencies do we need to capitalize on those opportunities?

- What competencies do we believe we currently have?

- How do our current competencies compare to those of our competitors? Can they be developed to gain competitive advantage in these markets?

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- What competencies do we lack? Can these competencies be acquired along with the companies that exhibit them?

There are four key components to applying the competency model to acquisition strategy development. The components are not steps because they do not occur sequentially but rather cyclically through a time continuum.

1. **Market Forecasting** - Envision future market opportunities and the competencies necessary to gain competitive advantage in them.

2. **Industry Analysis** - Evaluate competitors and trends within the industry.

3. **Competency Evaluation** - Inventory and test existing competencies.

4. **Decision Making** - Decide what markets to aim for and which competencies to acquire or develop in order to get there.

Market Forecasting and Industry Analysis

The first two components, market forecasting and industry analysis, are discussed together because they use the same information-gathering tools. Market forecasting is a comprehensive forecast of markets five to ten years in the future. The goal is to identify potential opportunities, select those that are a fit for the company, and determine what competencies will be needed to compete in those markets. Industry analysis examines both the industry and individual players within it. One objective of industry analysis is to map trends like the movement toward fewer, larger competitors, or the trend toward full service design/build/operate projects. Another objective is to profile competitors (present

and anticipated) so as to forecast their competitive strategies. Monitoring acquisition activity furthers an understanding of where the industry and competitors are headed.

Information-gathering tools useful in market forecasting and industry analysis include:

1. Environmental Scanning

2. Market Research

3. Competitive Intelligence

Environmental scanning is an ongoing search for eclectic information that supports the goals of market forecasting and industry analysis. Effective scanning provides clues to markets emerging, technologies coming on-line, and currently unspoken needs and wants of customers. Scanning contributes to an understanding of the overall industry by picking up on hints of what is to come.

Market research is a historical analysis of markets undertaken to identify trends and forecast opportunities that may not yet be apparent. The exercise is based on historical information but its goal is to extrapolate to the future.

Competitive intelligence is a systematic program for gathering and evaluating information about specific competitors. Whereas market research is based on the past, competitive intelligence gathers information about the future. Through competitive intelligence, it is possible to piece together the strategies of competitors and highlight practices of successful companies.

A team of managers from technical and business development areas can use these tools to tap primary and secondary sources of information. Primary sources include employees, sales reps, customers, competitors, suppliers, industry experts, and trade organizations. Secondary sources encompass financial reports, analyst reports, trade journals, databases, government records, newspapers, and conference papers. Differing perspectives within the group generate a more wide-reaching and potentially interesting set of information to synthesize. Team decisions about what markets and competitors to research can then be assigned to individuals to compile comprehensive and concise reports that the team can use for decision-making purposes.

Iventorying and Testing Existing Competencies

Another key component of acquisition strategy development is a thorough inventory and evaluation of the competencies currently held by the company. In the previous chapter, competencies were defined in three basic categories - technical competencies, business process competencies, and cultural competencies. Applying these categories to small environmental technology companies might yield a list of potential competencies as follows:

Technical Competencies

- Sets of technologies, production skills, and the cumulative learning and experience of scientists, engineers, and business developers. A company might identify three to six such competencies.

Business Process Competencies

- Identification of viable technologies

- System of assessing and protecting intellectual property

- Commercialization of technologies

- Product or service realization - how customers are developed, courted and sold to.

- Customer feedback loops - functions to be added, features to enhance

Cultural Competencies

- Environment of risk-taking and innovation within the organization

- How new ideas are generated, kicked around, and put into play

- The leadership style - not everyone can be a transformational leader

- How to avoid the Not-Invented-Here (NIH) syndrome

- Encouragement of collaboration, sharing, informal information loops

The inventory of competencies starts with listing five to seven "potential" core competencies the company believes it has. It is important to note here that being good at something does not make it a core competency. Every company can identify activities that it does well and define those as its core competencies. It may be necessary to be competent in a given task or process in order to participate in certain markets. However, that will not lead to competitive advantage unless the competency is rare, valuable, and difficult to imitate. Evaluating competencies using a series of five "tests" helps to determine their value and appropriateness to the overall strategy.[26]

1. The test of durability

   The more long-lasting a resource is, the more valuable it will be. Recall that core competencies are those that do not diminish but instead are enhanced with use.

2. The test of appropriability

   The value (profits) from a competency does not always accrue to its owners. A number of stakeholders (including customers, suppliers, and employees) will barter for a portion of the value.

   As an example, a study of companies that had adopted Just-In-Time (JIT) production demonstrated unanticipated results. For companies that were dedicated suppliers to major customers, all or a portion of the profitability (value) of this resource accrued to those major customers due to demands for price concessions.[27] JIT systems were probably necessary to remain competitive, but did not support competitive advantage.

3. The test of substitutability

   Can a unique competency be usurped by a different one? This is an example of why individual technologies cannot be considered true competencies. There will typically be various technologies suitable to the resolution of a particular problem. Value then must be created by other means.

4. The test of competitive superiority

   This test is definitive in the evaluation of a competency's value. Individual components of the competency may not be superior, but the competency itself is. A company's system components — computer hardware and software, technology, and processes involved in designing a thermal treatment system for hazardous waste —

are not necessarily individually superior to those of competitors. Instead, superiority

may be gained in the ability to customize systems. Or perhaps superiority involves

combining the least questionable byproducts and most efficient handling of off-

gasses. Finally, superiority may simply be the methodologies and practices that lead

to fully satisfactory (not necessarily superior) results at the least cost.

5. The test of inimitability

Inability to easily duplicate a competency is at the heart of sustainable competitive

advantage. It fends off competition - at least in the intermediate term. Characteristics

that may make a competency hard to copy and therefore valuable include:

- *Physical uniqueness* - E.g., real estate location or pharmaceutical patents.

- *Economic deterrence* - The market potential is small relative to the capital investment

  required to tap it. This ensures that once a firm enters the market, it will look

  unattractive to competitors.

- *Path dependency* - an economics term for the unique and lengthy path taken to

  develop a valuable competency. Information gathered, learning obtained, and

  numerous interrelated decisions made along the way create a competency that is not

  easily or quickly reproduced.

- *Causal ambiguity* - related to path dependency, causal ambiguity means that retracing

  the steps taken is impossible because nothing marks the path. The competency

  cannot be reverse engineered. Causally ambiguous competencies are often related to

  the organizational culture. For environmental companies, such a competency might

  be an uncanny ability to identify and obtain rights to emerging technologies.
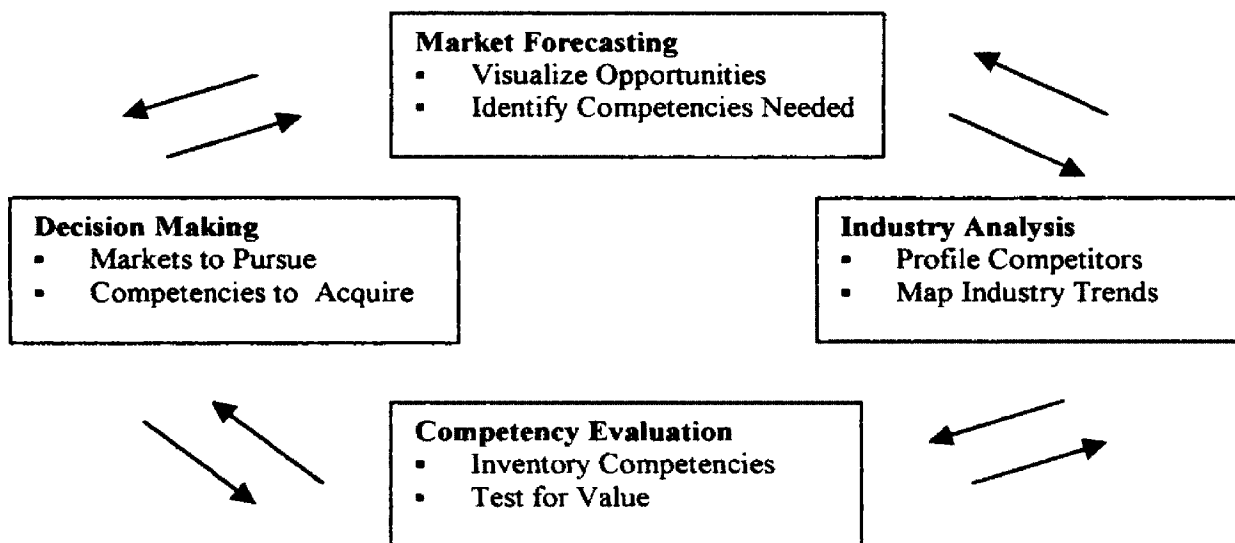
Path dependency and causal ambiguity are the factors most likely to create valuable competencies for small and midsize environmental companies. Technical competencies (combinations of technologies and production skills) are an integral part of competitive success for these companies. Such competencies are the product of years of research and development. They are path dependent and probably causally ambiguous as well. Business process competencies are typically path dependent and may also be causally ambiguous. The first two, physical uniqueness and economic deterrence are not common and are unlikely to be contrived.

The depth at which competencies are examined determines the value the exercise adds to acquisition strategy development. Using a scientific approach to analysis lends the discipline needed to maximize value. To apply this approach, describe a core competency in the form of a hypothesis. In this way, evaluation of the competency becomes an attempt to disprove the hypothesis. Test the hypothesis by holding the competency up for comparison to the competition while applying each of the competency tests. If the hypothesis cannot be disproved, it is probably true, meaning that the competency is truly rare, valuable, and difficult to imitate. If the hypothesis can be disproved, the analysis may provide direction for developing the competency or for identifying the competency in acquisition candidates.

Making Decisions about Markets and Competencies

The last component is the decision-making process: which future markets to aim for,

what competencies are needed, and where gaps might be filled in part through

acquisition. As stated earlier, the components are not sequential but circular; there are

relationships between components in addition to the relationship of the whole. The

diagram below helps to visualize this concept. While one can start anywhere on the

circle, the component activities most likely take place simultaneously, over time.

```
              Market Forecasting
              • Visualize Opportunities
              • Identify Competencies Needed


Decision Making                           Industry Analysis
• Markets to Pursue                       • Profile Competitors
• Competencies to  Acquire                • Map Industry Trends


              Competency Evaluation
              • Inventory Competencies
              • Test for Value
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Proper use of the framework provides the discipline to envision future markets and

determine which ones the company wants to compete in. It supports identification of the

competencies needed to gain competitive advantage in a particular market. It evaluates

the company's existing competencies, incorporating a "rigorous" comparison to

competitors. And ultimately, a strategy that embraces the four components gives a clear

picture of what to look for in the analysis of potential acquisition candidates. Company

structure or architecture must be supportive to capitalize on the benefits of the

competency model. The next chapter points out some pitfalls of traditional

organizational architecture and then describes a beneficial organizational architecture.

Chapter V. The Importance of Strategic Architecture

Successful realization of the competency model depends on a supportive organizational architecture. The strategic business unit (SBU) architecture popular in the diversification environment of the 70's and 80's impedes the competency model. This chapter introduces the topic of strategic architecture due to its importance to the competency model. However, an in-depth review of the concept is beyond the scope of this paper.[28]

Historical Architecture and the Hazards of the SBU Mentality

The concept of the SBU as the functional unit for competitive strategy has been ingrained in Western corporate strategy since diversification became the key to growth. However, what worked in the past has become an impediment to building competitive advantage. An SBU mentality holds companies back competitively because it leads to systems and processes that undermine innovation and slow ability to adapt to changing markets. Basically, it precludes the organization from capitalizing on its competencies. These unintentional results occur because of organizational dynamics inherent in the SBU structure including; *underinvestment,* the *imprisonment of resources,* and *bounded innovation.*[29]

Underinvestment in the development of core competencies results due to lack of management directive to develop or retain core competencies. The focus on short-term profitability of the unit is the typical measure of success in an SBU environment. Business units are viewed as profit centers and the managerial decision-making and

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control systems mirror that philosophy. Investment in core competencies does not fit traditional ROI models as the return is speculative, hard to quantify and difficult to attribute to the original hard cash investment. On that basis, line managers cannot justify expenditure on long term enrichment of competencies.

Imprisoned resources are those that individual SBU's see as belonging to them versus the organization as a whole. The competencies that develop within the SBU are not made available to other divisions because the line manager is not motivated or rewarded for sharing the "spoils". Thus, a turf-oriented, competitive atmosphere develops between business units. This precludes the sharing of competencies to enhance the overall performance of the organization.

Bounded innovation can be likened to tunnel vision when it comes to identifying sources of innovation. The isolationist tendency of SBU's under traditional firm architecture result in seeking innovation only within the confines of the individual SBU. Alliances between SBU's are viewed as less desirable than those with outsiders due to the lack of trust within the organization. This phenomenon shrinks the innovative capacity of the organization. Innovation becomes bounded by the SBU.

These concepts should be of interest to the small or midsize environmental technology companies because their structure generally mirrors the traditional SBU architecture. Companies involved in federal contracts are typically organized along project lines.

The organizational resources devoted to the project may include personnel, technologies, and production facilities. The project, organizational resources and competencies that develop become in essence an SBU and can demonstrate similar dynamics.

Strategic Architecture

A strategic architecture that imbues the organization with both opportunity and will to grow in a competency-based, dynamic way can be implemented. What does this architecture look like? How does it function? The competency model does not preclude the use of business units, however it does require rethinking how units relate. In a competency-oriented strategic architecture, competencies are viewed as the property of the organization. Business units view people, technologies and other resources as shared and they bid for use of those resources much like they do with capital.[30] Core competencies, and their value to the organization, are widely articulated. Top management develops reasonable and fair-minded ways of investing in and allocating these corporatewide resources.

Under a competency-based architecture, core competencies are centralized to serve the needs of the organization at large — like Wal-Mart's inventory management system. On the other hand, decision-making in relation to identifying and meeting customer needs may be decentralized. The free flow of information, atmosphere of collaboration, and formalized sharing of best practices gives line managers ongoing feedback on company strategy.

If the organization does not look and function as described above, steps can be taken to redesign the architecture of the firm.[31]

1. Make aggressive changes in the structure of the organization. Explain what goals are to be met with the changes. Work to obtain the buy-in and enthusiasm of employees to encourage the transition. Recognize and address fear of change or negativity.

2. Construct the strategic architecture of the firm around selected competencies that link customer need to customer satisfaction.

3. Supply the investment, support, and training needed to create the desired architecture.

4. Show stakeholders the positive results of the new architecture along the way.

5. Create monitoring and control systems that work with, not against, the goals of the strategic architecture. Measure progress toward goals and reward commensurately.

6. Make sure that the commitment to the new architecture starts with the company CEO. Top management must be the first to buy in and their behaviors and actions will have more impact than their words.

Designing a supportive strategic architecture enables the company to become a competency-based competitor. An organization that is structured to capitalize on its competencies is positioned to grow by replicating itself and by acquiring businesses that are a good competency fit. Commitment to a new structure generates energy and builds excitement as goals are attained and possibilities appear on the horizon.

Chapter VI. Conclusions and Recommendations

Recognition that certain companies transformed a changing competitive environment into competitive advantage gave rise to competency theory starting in the late 1980's. The competency model, presented in this paper, gives form to this new competitive strategy. While not developed specifically for acquisition strategy, the model is well suited to assist in devising strategic acquisition plans. Therefore, small and midsize companies can benefit from applying the model to their companies.

Factors related to maturation of the industry such as reduced availability of federal contracts, increased globalization, and creation of market niches tend to favor larger companies with a road range of capabilities. As a result, small and midsize environmental technology companies face a growth imperative. At the same time, size advantage may actually accrue to small and midsize companies in applying the competency model. A smaller company has more agility in reengineering the organization into a competencies-based competitor. The vision for a competencies-based strategy can involve more of the organization's employees. Their involvement serves as a brainstorming tool and as an opportunity to create shared goals and strategies. The systems, processes and culture necessary to build competitive advantage can grow as the company grows. Thus, investments in competencies are incorporated into expenditures necessary to accommodate growth.

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Recommendations for how to get started in becoming a competency-based competitor include the following:

1. Create a written plan for application of the competency model. The plan is a concise outline of how the work will be accomplished. A timeline is included.

2. Develop a management team, led by the CEO, responsible for guiding the process.

3. Involve line managers and other employees to the fullest extent possible. Create champions of change in each division or business unit.

4. Apply the competency model by engaging in its four components: market forecasting, industry analysis, competency inventory and evaluation, and decision making.

5. Incorporate appropriate changes in organizational architecture to support goals of the competency model.

6. Utilize findings generated by application of the competency model to create a written acquisition plan. The plan should include a version to be shared with acquisition candidates. The acquisition plan will provide a road map to follow as candidates are identified and evaluated against the strategies outlined in the plan.

A small or midsize environmental technologies company that accurately envisions the future can capitalize on that vision and grow strategically to build competitive advantage. Companies narrowly focused on current technologies versus competencies that drive innovative technologies lose their source of nourishment and wither. By building the competencies needed to spawn innovation, the competency-based company regenerates itself indefinitely.

Chapter I Notes

[1] Nicholas P. Chopey and Gerald Ondrey, "The Environmental Business Girds for Harder Times," *Chemical Engineering* 104, no. 9 (1997): 45-50.

[2] *Ibid.*

[3] From the SAIC Worldwide Web site http://www.saic.com. Founded by Dr. J.R. Beyster and a small group of scientists in 1969, SAIC now ranks as the largest employee-owned research and engineering firm in the nation. SAIC and its subsidiaries have more than 35,000 employees with offices in 150 cities worldwide. Revenues for the fiscal year ended January 31, 1998, were $3.1 billion.

[4] The SBA was established by The Small Business Act of 1953 to support and protect the interests of small businesses and to insure that a fair portion of total purchases by the Government are placed with small business enterprises. In order to qualify companies for its various programs, the SBA had to establish parameters for the definition of a small business. The SBA utilizes the framework established by U.S. Office of Budget and Management system of Standard Industrial Classification (SIC) codes. This system classifies over a 1000 business activities into individual industry codes. The SBA uses these codes to assign size standards to various industries under two broad rules. A company is considered to be a small business if it has less than:

1. 500 employees for most manufacturing and mining industries, or
2. $5.0 million in average annual receipts for most nonmanufacturing industries.

There are a number of exceptions to these two rules. While environmental engineering and technologies firms are considered nonmanufacturing, by exception they fall under the 500-employee size standard.

[5] Thomas L. West, "Defining the Midsize Company and the Market," in *Mergers and Acquisitions Handbook for Small and Midsize Companies* (New York: John Wiley & Sons, Inc., 1997), 3-9.

The perspective of the merger and acquisition intermediaries is relevant since the goal is a strategy for acquisition. While each intermediary could potentially use its own definition, a generally accepted breakdown is as follows:

	# of Employees	Sales volume
Small Business	<10	< $1 million
Mid-size Business	10 to 249	$1 million to $20 million
Large Business	250 or more	>$20 million

Chapter II Notes

[6] Andrew G. Wright and Debra K. Rubin, "Booming Economy Keeps Green Markets Afloat," *Engineering News-Record* 241, no.1 (1998): 37.

This article is part of *ENR's* annual report on the top 200 environmental firms and trends in the industry. After a 5% decline in the market in 1996, the top 200 firms recorded a $2 billion increase in gross revenues to $24 billion for 1997. A major driver of the increase was a strong domestic economy that put industry in a position to invest in cleaner technology. In addition, business expansion carries with it an environmental component. As a result, private industry accounted for 51% of the revenues of the top 200 firms - the highest ratio ever.

[7] Andrew G. Wright, "Eager Players Enter the Market as Water-Wastewater Pot Grows," *Engineering News-Record* 239, no. 2 (1997): 54.

[8] "Waste Markets Start to Slide, but Water is an Easy Glide," *Engineering News-Record* 241, no. 1 (1998): 44.

[9] Marc D. Kozin and Kevin C. Young, "Using Acquisitions to Buy and Hone Core Competencies," *Mergers & Acquisitions* 29, no. 2 (1994): 21.

[10] Technology transfer programs are those set up by the government or universities to attempt to move technologies out of laboratories and into the commercial marketplace.

Chapter III Notes

[11] C. K. Prahalad and Gary Hamel, "The Core Competence of the Corporation," *Harvard Business Review* (May-June 1990): 79-91.

C. K. Prahalad is a professor of corporate strategy and international business at the University of Michigan and Gary Hamel is a lecturer in business policy and management at the London Business School. A number of subsequent articles give high praise to "Core Competence," using terms like "famous" and "influential" in describing it. Resources internal to the firm have been studied at various times since the 1950's — SWOT analysis is an example. However, this article is credited with examining the role of competencies in a new and intuitive way.

[12] George Stalk, Philip Evans, and Lawrence E. Shulman, "Competing on Capabilities: The New rules of Corporate Strategy," *Harvard Business Review* (March-April 1992): 57-69.

Boston Consulting Group VP's, Stalk, Evans, and Shulman, build on the concepts previously described in "Core Competence". The authors expand the definition of competencies (as provided by Prahalad and Hamel) to include business systems and processes that create customer driven benefits and features. This article utilized the term "capabilities" in place of competencies.

[13] David J. Collis and Cynthia A. Montgomery, "Competing on Resources: Strategy in the 1990's," *Harvard Business Review* (July-August 1995): 118-128.

Collis and Montgomery use the term "resources" in place of "competencies" or "capabilities" as they see the latter two being part of a more overarching resource base. Significant contributions of this article are an emphasis on the relationship of the internal competencies to the external competitive environment and a series of tests to determine the value of a competency. These tests expand substantially upon the three tests originally developed by Prahalad and Hamel.

[14] Stalk, Evans, and Shulman (1992).

[15] Prahalad and Hamel (1990).

[16] Stalk, Evans, and Shulman (1992).

[17] Jay B. Barney, "Looking Inside for Competitive Advantage," In *Core Competence-Based Strategy* (London: Thomson Business Press, 1997): 14-27.

[18] Prahalad and Hamel (1990).

[19] Stalk, Evans, and Shulman (1992).

[20] Cross docking is a system that involves moving inventory from dock to dock without ever having it stored. The inventory arrives at a warehouse dock only to be separated, repackaged, and immediately sent on to the various stores that have made requests for it. 85% of inventory never goes into the warehouse. The inventory system accomplishes several key goals. It speeds up supply of inventory in demand and lowers prices by minimizing inventory-handling costs.

[21] Wal-Mart invested in and developed a unique, private satellite-communication system that provides point of sale information from individual stores directly to vendors on a daily basis.

[22] Jay B. Barney, "Looking Inside for Competitive Advantage," In *Core Competence-Based Strategy* (London: Thomson Business Press, 1997): 14-27.

[23] Andrew Campbell and Kathleen Sommers Luchs, eds., *Core Competence-Based Strategy* (London: Thomson Business Press, 1997).

[24] These refining characteristics have been collected from all of the referenced competency literature.

Chapter IV Notes

[25] David J. Collis and Cynthia A. Montgomery, "Competing on Resources: Strategy in the 1990's," *Harvard Business Review* (July-August 1995): 118-128.

[26] Collis and Montgomery (1995).

The significant contribution that *Competing on Resources* made to the evolution of competency theory was a substantially more in-depth set of tests than the original three outlined by Prahalad and Hamel. The tests outlined in this chapter are from *Competing on Resources.*

[27] R. Balakrishnan, T. Linsmeier, and M. Venkatachaluam, "Financial Benefits from Improved Inventory Utilization: Effects of Customer Concentration and Cost Structure," *Accounting Review,* April 1996, as excerpted in Jerold L. Zimmerman, *Accounting for Decision Making and Control.*

Chapter V Notes

[28] For readings in the area of strategic architecture, see Andrew Campbell and Kathleen Sommers Luchs, "Part III - Managing Core Competencies Across Business Units," in *Core Competency-Based Strategy* (London: International Thompson Business Press, 1997), 155-320.

This section provides practical insight to how companies made up of a portfolio of businesses manage skill sharing and transfer of knowledge. The pros and cons of centralization and decentralization are discussed as well.

[29] C. K. Prahalad and Gary Hamel, "The Core Competence of the Corporation," *Harvard Business Review* (May-June 1990): 87-89.

[30] Prahalad and Hamel (1990).

[31] These steps expand on those outlined in Stalk, Evans and Shulman, *Competing on Capabilities: The New Rules of Corporate Strategy,* 1992.

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