Sustaining Strategic Advantage in the Information Age

Gezinus J. Hidding, Ph.D.
Assistant Professor
School of Business Administration
Loyola University Chicago
25 East Pearson Street
Chicago, IL 60611
(312) 915-7059 (phone)
(312) 915-6432 (FAX)
e-mail: ghiddin@luc.edu
homepage: http://orion.it.luc.edu/~ghiddin

Abstract

In the Information Age, the dynamics of competition is intensifying. In such dynamic environments, how long can firms exploit an (IT-based) advantage? We classify various well-known IT strategy frameworks by the strategy theory they are based on and summarize their basic logic. We show that traditional strategy thinking ignores speed of change or dynamics of competition.

A new strategy framework, Sustainability Analysis [69,70], extends strategy theory, takes into account dynamics and different speeds of change. We describe this new strategy framework and how it advances our understanding regarding the sustainability of a competitive (IT-based) advantage.

Introduction

The speed of change and competitive dynamics are increasing in the Information Age. Turnaround time for (paper) mail was many days; for e-mails it is hours. Development of IT products is measured in “web years.” In such fast-changing environments, how long can firms exploit an advantage before renewal is necessary? Even though “sustainable” has long been used as an adjective to “competitive advantage”, traditional (“Industrial Age”) strategy thinking implicitly assumes that change is moderate and predictable, that market shares are stable and their erosion is bad. However, that thinking is no longer applicable universally: Market shares of fast-changing “Information Age” products, e.g., Intel’s 486 chip, generally erode rapidly. For those products, the “management of erosion” is not a sign of failure, but of success.

But, such fast-cycle competition is not merely replacing the “Industrial Age” type of competition. They co-exist. Traditional environments have co-existed alongside slow-changing ones. For example, the business of delivering highly-engineered systems, e.g., one-of-a-kind IT infrastructures for large global organizations. Such products are highly complex, non-standardized, have no cost economies and change slowly. Nevertheless, such businesses have been very successful, but do not fit traditional strategy thinking, which is based on moderate cost reductions over time through standardization and economies of scale.

Thus, there is a wide diversity in competitive dynamics. The conventional thinking still applies for situations with “standard” competitive dynamics such as in traditional “Industrial Age” businesses. However, for slower or faster dynamics, the strategy thinking is much less developed. How can a firm predict how fast any given business will evolve? How long will an (IT-based) competitive advantage last? What will the critical success factors be? Clearly, recommending IT strategies is becoming more difficult due to increasing diversity in competitive dynamics.

Recent thinking and research into strategy has started to address change and competitive dynamics. For a good overview, see [21, 59]. But, even the contemporary

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1 Earlier versions of this paper have appeared in Hidding and Williams (1992) and Williams and Hidding (1989).
strategy research has not focused on substantial differences in speed or competitive dynamics. There is one exception, however: Sustainability Analysis (SA) [69, 70].

SA analyzes advantages at the product level. Value is created through disequilibrium. SA takes obsolescence - the evolution in which advantage and value is eventually lost - as a given. The key question is how fast the erosion will occur. SA recognizes different "ecologies" in which competitive dynamics evolve at different speeds. To ease explanation, it distinguishes three such ecologies: Slow cycle, standard cycle, and fast cycle. Success can be achieved in any ecology, but the critical success factors, and hence recommendations for (IT) strategy, differ significantly.

Overview of this paper

Sustainability Analysis will be summarized in the second half of this paper. The insights for IT strategy will be highlighted. The first half of this paper reviews well-known IT strategy models and classifies them according to the underlying strategy theory. For each group of models, we will summarize the basic strategy logic.

(IT) Strategy logic

Strategy theory aims to explain or predict a strategic advantage based on a number of potential factors, including IT. “Sustaining competitive advantage using IT” is a special case of “sustaining competitive advantage”. IT strategy frameworks are effectively specializations of general strategy theories. Therefore, we believe that IT strategy frameworks should be rooted in one or more theories regarding sustaining competitive advantages in general.

Particularly considering IT, strategy theory should stipulate “logic” of the form: “If <conditions> then the firm will obtain a competitive advantage that can be sustained for x period of time”. We call this a “control theory” view of strategy [31], after [19], and outlined different ways in which such “logic” can be applied in strategy decision making. Such logic should take into account speed of change (e.g., technological) and competitive actions and reactions. From this perspective, we did a literature review of well-known IT Strategy models². We distinguish models in “theory-based” and “ad-hoc”, i.e., those that are not rooted in strategy (or other) theory. First, we will review ad-hoc models.

Ad-hoc models

Several frameworks attempted to synthesize the experiences of various successful leading-edge cases. Examples of such frameworks are Critical Success Factors [56], the Customer Resource Life Cycle [37], Facilitators [50], Competing in Time [39], and numerous matrices or “grids”, e.g., the Strategic Grid [47], the Opportunities Matrix [5], or the Strategic Option Generator [71]. Others [42, 67] derived frameworks from cases where IS failed to be strategic. A number of well-known Information Systems were not conceived to be strategic, but to solve operational problems [17, 61]. Strategic value was recognized only after the IT had been in operation for some time.

Perhaps because the field was so young, these ad-hoc frameworks were useful, but not rooted in established theory of strategy or related discipline. Next, we will review models that were rooted in strategy theory.

Strategy-theory based models

We distinguished two high-level categories of (IT) Strategy models: “static” and “dynamic.” “Dynamic” models explicitly incorporate change and/or dynamics of competition, whereas “static” models incorporate neither. We will first review static models.

Static models

Industry Structure Analysis

IT Strategy models, e.g., [3, 9, 51, 54], extended the arguably best known (“Industrial Age”) strategy model: Porter’s Industry Structure Analysis [52]. ISA is a qualitative model that describes forces in the industry, i.e., external to a firm. Its basic logic is: “If industry forces are decreased (e.g., buyer power, rivalry) then that will lead to competitive advantage, and possibly even change industry structure.” Also, a firm does not have control over many factors in the model (e.g., regarding new entrants or competitors). Hopper, referring to ISA-based models, said: “old models no longer apply” [35].

Value Chain (System)

Another Industrial Age model, the Value Chain (system), which was popularized by Porter [53], is a qualitative model that recognizes discrete value-adding activities internal to a firm. The basic logic is “If the firm exploits activities in which it can add more value than competitors, and de-emphasizes, or even outsources, other activities, or if it exploits linkages within the Value Chain or with customers and suppliers then the firm will

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² In this paper, we will use the word “model” to also mean framework, concept, theory, or paradigm.
enjoy a competitive advantage.” It was extended to IT Strategy [11, 54, 57], including Inter-Organizational Systems (IOS): linkages with customers and suppliers [9].

Competitive Fit

Several authors [29, 40, 57] have described various models of fit (involving IT). The seven-S framework was interpreted [8] to analyze fit in the context of IOS. Instead of looking either at a firm’s (internal) capabilities or its environment, several researchers, argued that the “whole concept of strategy involves matching” them [1, 38, 63], which is the concept of competitive fit. The logic says “the better the fit, the better a firm’s performance”.

Static strategy thinking explores mostly cross-sectional relations; it takes “snapshots” at a point in time. A snapshot, while useful, does not give a longitudinal view: how a competitive situation plays out over time. Competition in the Information Age requires a (dynamic) “motion picture.”

Dynamic models

It is a cliché that business is changing rapidly, and that IT increases change and competitive dynamics. Such issues are considered explicitly in recent (IT) Strategy thinking, which adopts assumptions that are different from traditional economics-based strategy thinking: Firms’ internals (e.g., assets or capabilities) are different [19], change (e.g., technological innovation) is a fact of life [49], and disequilibrium is the key to strategic advantage [59].

Next, we review a number of dynamic IT strategy models (grouped by the strategy theory on which they are based). We first review models that explicitly take into account competitive dynamics (actions and competitive reactions) but not speed of change. We subsequently review models that explicitly take into account dynamics and speed of change.

Competitive dynamics only

Resource-based theory

The resource-based theory of the firm [4, 22] was extended to IT Strategy [12, 46]. Closely related is the concept of “Core Competence”. Resource-based theory views the firm (or SBU) as a bundle of resources, which includes tangible or intangible assets, capabilities, or skills. Resource-based models (which are qualitative) focus on the internals of the firm, and, importantly, on potential competitive reactions, particularly imitation.

The basis logic is that an advantage can be sustained when there is resource heterogeneity (resources are different across firms, i.e., unique to a firm) and resource immobility (competitors find it hard, or impossible, to imitate (or substitute) resources). Resource immobility can be reinforced by “isolating mechanisms”, i.e., mechanisms delaying imitation by competitors, for example, “complementary” resources, i.e., synergistic combinations of particular assets [64].

Through the lens of resource-based models, key IT-related resources are: capital to invest in IT [43], proprietary IT [48], information itself [44], capabilities regarding IT, e.g., technical or management [55], or information (technology) resources that are complementary to unique non-IT resources [58, 66].

Increasing Returns

Recently, the (economic) theory “Increasing returns” has been advanced [7]. Closely related is the concept of “positive feedback” cycles which has roots in Industrial Dynamics [24]. Increasing returns are particularly relevant in IT-intensive industries such as software. The concept is cited frequently in debates about the (ir)relevance of traditional anti-trust laws in the Information Age.

The basic logic is: “The more (less) of advantage a firm already has, the more (less) it can extend the advantage.” That cycle can lead in certain circumstances, e.g., operating system software, to “tipping”, i.e., leaving only one firm providing the product.

Increasing returns has been extensively applied in theories about the role of “communities” as a source of competitive advantage in the Information Age [27]. Incumbent companies might get caught in “death spirals”, i.e., negative self-reinforcing cycles, due to use of IT by nimble entrants [14, 21].

Competitive dynamics and speed of change

A framework has been developed combining insights from resource-based theory (particularly resource heterogeneity), first-mover advantages (particularly preemption), and “project life cycle analysis” of how long a competitor will take to respond [23]. The basic logic is “if the firm can exploit unique resources to target an “exploitable link”, and competitors take x time to imitate then the firm will enjoy a sustainable competitive advantage for x+? time.”

Our literature survey did not turn up models that focus on speed of change while ignoring competitive dynamics.
Scenario Analysis

Scenario Analysis [10, 60], while not rooted in strategy theory, can be used to manage risk in environments that are dynamic, rapidly changing and hence uncertain. For a given “focal issue”, it aims to develop multiple scenarios (typically four of them) that each specify base assumptions and actions. The scenarios should each be plausible and internally consistent, but mutually exclusive. The basic logic is that the decision maker(s) will recognize, as reality unfolds, which scenario is most relevant. Many of the scenario building exercises are proprietary and unpublished; some deal with IT. This author participated in a (proprietary) scenario building exercise regarding multi-media technology.

(IT) Strategy Logic: Conclusions

Relative to the abundant use of the adjective “sustainable” (to “competitive advantage”), few models focus on how long firms might enjoy their advantage, or how fast an advantage might dissipate, see, e.g., [18].

In our opinion, authors are generally not clear on what they declare to be (not) sustainable? The “advantage”? The firm (or SBU)? The assets, or capabilities? The product or service? For example, certain Hewlett-Packard products enter and exit the market rapidly, its (physical) assets change rapidly, its skills evolve rapidly, yet there are things changing very slowly: its values, its mission, … Research into why HP and other “visionary” companies sustain advantages is described in [16]. The companies they studied were founded in 1945 or earlier (median founding date: 1902)! The sustainability of the firms’ advantages turned out to be related to certain core values and principles that were sustained over decades.

Some, e.g., [61], doubt that a strategic advantage (due to IT or not) can be “sustainable”. They interpret or define “sustainable” as lasting long, or forever (practically speaking), but note that nothing lasts forever. Hence, they argue, no advantage can be sustainable. Instead, some use the term “temporary” advantage, e.g., [46]. “Hustle as strategy” has been proposed [6] where firms concentrate on operating details, move fast, and do things well. He suggests that firms don’t need long-term strategic plans to guide them. Instead, they need an “institutional vision - a shared understanding of what their firm is about and where it is headed ... A vision is the glue that holds together the firm ... It is sketched, over time, from the deep knowledge of the organization’s internal capabilities, traditions and values.”

Recently, a new paradigm regarding sustainability has been advanced in the strategy literature by Prof. Jeff Williams [69,70]. He addresses speed of change and competitive dynamics (actions and competitive reactions). That new paradigm will be described next, along with its implications for IT Strategy.

Sustainability Analysis for IT Strategy

Sustainability Analysis analyzes advantages at the product level. Products are what generates revenue because customers buy them (or not). He takes as a given that no (product) advantage lasts forever and asks: “How long can an advantage, once obtained, be sustained?”

Williams summarizes competitive dynamics in three “laws”: Alignment, Convergence and Renewal. Alignment says to maintain competitive fit (as described above) dynamically, i.e., continue to maintain fit as external conditions (e.g., industry forces, see above) and internal conditions of the firm (e.g., value chain, resources or core competencies, see above) are changing. Value chain theory does not take into account changes. Convergence states that competitors will react and imitate the successful firm and product advantage will dissipate. Renewal counteracts convergence: The firm should innovate and find new sources of uniqueness (with Alignment) in order to prosper (before Convergence sets in again). It analyzes how alignment can be maintained in what is, in effect, an ecology of the organization and its environment (customers and competitors). The interplay of Alignment, Convergence, and Renewal yields successive (temporary) advantages with durations that are shorter or longer depending on the ecology. No strategy theory ever explicitly analyzed duration of advantages. Even resource-based theory, which acknowledges copying of ideas and barriers to imitation does not analyze the resulting speed of competitive dynamics.

The terminology (ecology, evolution, renewal, ...) borrows heavily from biology, reflecting a broader trend in management thinking, see, e.g., [28, 34, 41, 59].

Extending [62], Williams’ most important contribution is the insight that different (co-existing) ecologies evolve at different speeds. For example, drastic price reductions (say, 20%-30%) in personal computers are met by competitors almost overnight. For other products - e.g., car rental services - moderate price reductions (6%-8%) take over a year to take hold in the market place. For some products, competitive advantage is gained or lost in very short order (e.g., RAM chips); for others, it takes a decade (the DOS operating system).

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4 By “product” we mean any combination of physical goods, services, and information.
Timing of entry or exit is critical in some markets (e.g., microprocessor chips), but much less so in other markets (management consulting).

Three ecologies

For reasons of pedagogy, we distinguish three different ecologies that evolve with different speeds: slow cycle, standard cycle, and fast cycle. In slow-cycle ecologies, product are renewed every 7-10 years (or even longer). Products classified as slow cycle include computer operating systems (Microsoft), investment banking (Goldman Sachs), management consulting (McKinsey), communication networks (AT&T), hub-control airlines (Delta Airlines), patented prescription drugs (Bristol Myers Squibb). In standard cycle (“Industrial Age”) ecologies, products are renewed every 3-6 years. Standard cycle products include fast food (McDonald’s), appliances (Maytag), automobiles (General Motors), tires (Goodyear), food (Nestle), long-distance telephone services (AT&T), standardized financial services, e.g., credit cards (Citibank). In fast cycle, products are renewed every 6 months - 2 years. Fast cycle products include women’s fashion (Liz Claiborne), toys (Nintendo), personal computers (Compaq), cellular phone handsets (Motorola), microprocessor chips (Intel), fax machines (Xerox). These three ecologies co-exist. In the Information Age, there is more diversity than ever: Any firm might compete in any or all of these ecologies.

The implications of this new paradigm for IT Strategy have not yet been explored. The remainder of this paper summarizes this new paradigm as well as its implications for IT Strategy. For each ecology, it will describe key resources and strategies and typical examples of how they were reinforced with IT. The main purpose of this paper is not to present an exhaustive literature survey. Instead, the aim is to convey key aspects of how IT can be used strategically in different ecologies. We first describe the standard cycle ecology.

Standard Cycle

Traditional “Industrial Age” strategy models, such as [52,53], generally fit standard cycle ecologies. Standard-cycle industry environments are typically oligopolies. A key asset is volume or scale of operations. Standard cycle operations become large and complex over time, which yields the risk of diseconomies of scale. To counteract, a key competence is “orchestration”, or simultaneous optimization of numerous activities. For example, careful marketing (branding, pricing, advertising) to not hurt other products; balancing manufacturing capacity; (re)training many workers to achieve high volumes at low unit cost; training many sales people, resellers or service organizations.

Generally, the most important measure of success is market share. Large companies (“400 pound gorillas”) fight “wars” over small changes in market share: Coca Cola versus Pepsi, or GM versus Honda. Typically, the products in a standard cycle ecology are tangible goods, e.g., automobiles, tires or appliances. They must be renewed every 3-6 years, before convergence curtails the advantage. Services and information products can also be standard-cycle, e.g., long-distance telephone service, or AC Nielsen tv ratings.

In a standard-cycle ecology, critical strategy elements that drive uniqueness (and must be maintained or extended in renewal) include standardizing products and services (to exploit economies of scale), exploiting bargaining power, cutting cost, differentiating (standardized) products and services, and segmenting markets.

Standard Cycle: Strategic Use of IT.

To reinforce standardization, manufacturing companies, for example, use CAD/CAM to manage standardized “platforms”, component (building block) modules and their interfaces, e.g., Audi cars. To configure modules into numerous product combinations (mass customization), this author developed configuration software (similar to XCON/XSEL) for an international computer manufacturer. Services are standardized through IT, e.g., scripts for telephone operators, menus in Automated Voice Response systems, or Automated Teller Machines.

Note how standardization is inherent in information systems. Data bases contain standardized data. Programs are standardized processes. They readily enable economies of scale, which are tempered, however, by the need for large-scale orchestration. AC Nielsen, for example, maintains large data bases of television viewing behavior. All activities are carefully orchestrated, from how television viewing is recorded to how the analysis is delivered to customers.

Traditionally, IS were designed to control (costs of) the business. For example, many systems had the word “control” in their names: Inventory control, distribution control, or manufacturing control. ERP’s such as SAP, PeopleSoft or Baan now fulfill such functions. IT enhances bargaining power: Rosenbluth used its reservation systems to negotiate discounts from airlines. End-consumers enjoy substantial consumer surplus through, e.g., IT-enabled comparison shopping (e.g., Auto-by-Tel). IT (e.g., data warehousing/mining) can
help to segment markets (Clemons and Weber, 1994) or enable “micro” segmentation.

IT-enabled business process reengineering has changed orchestration to a more horizontal orientation. However, the essence of standard-cycle organizations is still orchestrating scale, standardization, cutting costs, or increasing market share, which, can, of course, be tracked using Executive Information Systems (EIS).

**Fast Cycle**

As the name implies, fast cycle ecologies evolve faster than standard cycle ecologies. The key source of uniqueness is generating and delivering new ideas that rapidly become extremely popular across a large geographic area, even globally; truly an Information Age phenomenon. However, new ideas can, and are, rapidly copied and sold at lower cost, i.e., convergence occurs very fast, requiring renewal every 6 months - 2 years: Ideas catch on (and revenues increase) with breathtaking speed and become “yesterday’s news” (and revenues decrease) equally fast (e.g., junk bonds).

Fast-cycle organizations, to an outsider, may seem “out of control”, but there are simply different competencies. The timing of exit is planned before market entry, whose timing is (also) critical. A basically identical product is distributed very fast in large quantities around the globe: audio equipment (Sony Walkman), fashion (Benneton), Web browsers (Netscape), or new services on Cash Machine networks. Prices change dramatically and fast (Intel chips), inventory is extremely minimized (Dell). Well-known firms, e.g., Motorola, incurred large write-offs on inventory that depreciated substantially within one quarter. Branding and market segmentation are less relevant competencies; the product has come and gone before such (traditional) strategies could make a significant impact.

In a fast-cycle ecology, critical strategy elements that drive uniqueness (and must be maintained or extended in renewal) include conceiving “hot” new ideas, timing of entry and exit, rapid distribution across a large geographic area, dynamic pricing, and maintaining minimal (possibly zero) inventory.

**Fast Cycle: Strategic Use of IT**

To reinforce fast-cycle strategies, fast-cycle companies use CAD/CAM to design products such that they can be easily changed but can be manufactured and distributed fast in large quantities. Groupware and video conferencing can be used to rapidly develop new ideas across department and geographic boundaries. Financial houses employ “rocket scientists” that use supercomputers to come up with new ideas for financial products.

IT to gather and disseminate competitive intelligence and information about their own sales is extremely important, as one major manufacturer we worked with found out when it was almost too late. Databases can be used to spot market trends within a few days. EDI technology has been used to speed up global distribution of products, particularly in facilitating customs clearance. Of course, aside from IT, the organization needs to be oriented to speed as well. For example, if 16 signatures are required to authorize a price decrease, workflow automation is less important than redesigning the organization. Similarly, if a fast-cycle organization has bloated inventories, a redesign of the purchasing and manufacturing process is more important than IT to better manage inventory.

Executive Information Systems (EIS) can track important measures (that are different those for standard-cycles organizations) such as speed (to market; of production; of delivery), speed of changes in demand, or competitor’s pricing.

**Slow Cycle**

Traditional approaches might view slow-cycle ecologies as fragmented and (mistakenly) consider them unimportant. Even in the Information Age, per-unit margins are typically high, as uniqueness stems from “lock-in” with customers. Locations such as airport hubs are often controlled (long-term!) by one airline (e.g., Delta in Atlanta) [2]. Despite deregulation, customers are still tied to the company with the one (gas) pipe or cable to your house. “Lock-in” is also manifested through resistance to switch to a different product (spreadsheet or Operating System).

Slow-cycle firms (e.g., consulting or precision manufacturing) often have small overall market share, small “lot sizes” (1!), and low volume of (high-margin) transactions. Oftentimes, such goods or services are incredibly complex, requiring an extremely high level of competence in the seller (e.g., Boeing). Trust is critical and based on close personal bonds between buyers and sellers (McKinsey). These relationships are highly sensitive to cultural differences, as experienced frequently by American firms doing business in Europe.

In a slow-cycle ecology, critical strategy elements that drive uniqueness (and must be maintained or extended in renewal) include close personal relationships, high complexity of the product/service (e.g., as in custom engineering services), ties to a location, or regulation. They cannot be easily and profitably copied by others, i.e., convergence takes a long time, or even internally by...
the same organization, yielding product renewal every 7-10 years or even longer. Standardization is hard to achieve, and often viewed as negative by customers. As a result, it is often difficult to grow (except by operating in a different place).

Slow Cycle: Strategic Use of IT

To reinforce slow-cycle success factors, firms use CAD/CAM most importantly in order to be able to manage the (extreme) complexity of their products (Boeing). Communication among people with the appropriate (level of) expertise can be ensured with Knowledge Management technology such as video conferencing or groupware [34].

Although ultimately nothing can substitute for long-standing personal bonds, data bases can help to record as much information about the other party as possible. Such information can then be used to further cement a bond over time. Data bases can also help to keep track of potentially desirable locations. One gas-pipeline company that we worked with kept track of all for-sale announcements of land with pipeline right-of-ways. Even a small, seemingly insignificant, right-of-way might be a key link when combined with other (potential) parts of their network.

In order to keep track of or influence regulation, IT can be used to analyze voting patterns of elected representatives. Such information can be then used to select representatives for lobbying efforts and how they should be approached. Also, the Internet is increasingly being used to quickly rally many citizens around a certain issue (e.g., immigration reform) and have them send e-mails or other communications to government officials advocating a certain position.

Executive Information Systems (EIS) can track important measures (that are different those for standard-or fast-cycle organizations) such as (high) pricing and margins, win-loss analysis of proposals (focusing on desired complexity and customer relations).

Hybrid ecologies

Some products have characteristics of more than one ecology (“hybrid”). An example is air travel using frequent-flier mileage programs. With the travelers’ information, the service can be personalized (e.g., meal or seating preferences) without requiring personal relationships. Large IT systems (e.g., cash machines networks, or e-commerce systems) are hybrid ecologies: They have an infrastructure (telecommunications or Operating System), which by its nature needs to stay stable for many years (a la slow-cycle), and applications, which can evolve dramatically within a few years (a la fast cycle).

Transitions

Within a given ecology, things are constantly changing, but the speed of change and the types of competencies and critical strategy elements stay qualitatively the same. A change in the speed of change (similar to a non-zero second derivative) is a transition from one ecology to another. Transitions are a change in industry structure, a change in the rules of the game, traditionally a topic of great interest in IT Strategy. For example, deregulation (e.g., airlines, gas, electricity) generally means a shift from slow-cycle competition to standard-cycle competition. Often times, marketing (and related IT), e.g., segmentation or pricing, is a critical capability that needs to be developed from scratch.

Also, technological change or shifting customer preferences can cause transitions. We recently worked with an equipment manufacturing company whose products are transitioning from slow-cycle (highly-engineered, one-of-a-kind custom-made products) to standard-cycle (highly reliable, standardized products). The resulting changes in, e.g., product standardization, process engineering, or purchasing consolidation, were important factors in IT strategy, e.g., regarding CAD/CAM, or ERP packages.

Multi-ecology management

The most difficult situation to manage is when different (product) ecologies must be managed simultaneously, e.g., when an organization commercializes many different types of products (e.g., Sony, HP, Philips, Samsung, Bosch). As explained above, each ecology requires its own set of success factors in order to create or sustain a business advantage. Finally, it requires that the (same) EIS track different key performance indicators to monitor the businesses’ evolution and progress regarding their implementation plans. Of course, simultaneously tracking such different measures presents a challenge for the organization’s leadership. It requires tremendous mental agility on the part of executives to apply different strategy thinking for the different ecologies.

Sustainability Analysis Logic

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1 Hybrid ecologies, transitions and multi-ecology management could not more fully described due to space constraints.
As mentioned earlier, Sustainability Analysis analyzes competitive advantage at the *product* level. Products are what generates revenue because customers buy them (or not). Products (and related strategies) are the interface between external conditions and internal conditions of the firm. Sustainability Analysis requires a shift to a *strategy dynamics language* that incorporates and extends traditional strategy thinking, e.g., “profitability” shifts to “profit margin compression”, “pricing policy” to “rate of price reduction.”

Sustainability Analysis is about analyzing and planning for the appropriate ecology. We summarized the logic in three steps [31]: 1) Classify the existing situation, 2) select the appropriate ecology, and 3) Plan and manage accordingly. These steps will be described next.

**Classify the existing situation**

25 measures can be used to classify a situation along the spectrum of slow, standard, or fast cycle [31, 33]. They can be used to determine the “as is” ecology. Particularly in working with senior executives at various multi-ecology organizations, we have found that such measures promoted a shared language and understanding across different ecologies and turned previously unresolved debates into constructive dialogue.

**Select the appropriate ecology**

The firm can decide to stay in the “as is” ecology, or to transition to another, i.e., change industry structure (perhaps exploiting new IT capabilities). Executives must choose the “to be” ecology. They must decide “what kind of company they want to lead.” No sustainability logic dictates which ecology is best. Clearly, other ecologies may be more or less attractive because of factors such as market size, organizational capabilities, or the board’s opinion. However, in our experience, executives/firms can usually choose from two different ecologies. Particularly if competitors have weak competitive intelligence, they may take long to realize the rules of the new game and, accordingly, respond slowly [33].

**Plan and manage accordingly**

Strategic recommendations in general, and for IT in particular, must be designed to reinforce the key success factors of the selected ecology. The organization must then be managed to preserve dynamic competitive fit over time. Even if the firm does not transition to another ecology, we have found that most firms have not fine-tuned resources or strategies according to the “as-is” ecology.

Note in our examples of IT for the various ecologies that success depends not on the information or technology itself, but how it is used. Is CAD/CAM used to manage extreme complexity (fast cycle), to standardize products (standard cycle), or to increase speed (slow cycle)?

**Benefits**

By focusing on competitive dynamics and the speed of evolution in the different ecologies, Sustainability Analysis leads to increased *predictability*. In multi-ecology organizations and/or changing market conditions, executives worked with have found that particularly helpful. It allows them to predict the qualitative changes and how long an advantage can be sustained before it is eroded by competitor reactions.

Not only does Sustainability Analysis increase predictability about what high-level strategic actions are needed, its action recommendations are significantly easier to implement than recommendations resulting from Industry Structure Analysis, according to executives participating our earlier study [31].

**Conclusions**

In the Information Age, the speed of change and the dynamics of competition is increasing. Consequently, it is important that (IT) Strategy models take into account speed of change and competitive dynamics. We argued that IT strategy frameworks are effectively specializations of general strategy theories. In the first part of this paper, we classified various well-known IT strategy frameworks by the strategy theory they are based on, and reviewed their basic logic. We saw that several well-known models are static, i.e., they do not incorporate speed and dynamics of competition. Other models incorporate competitive dynamics but not speed of change. Few models incorporate both, but they do not recognize the fact that evolutionary speeds can be quite different across different businesses. One notable exception is Sustainability Analysis, a new paradigm being advanced in the strategy field. The second half of this paper summarized Sustainability Analysis, its logic, as well as its implications for IT Strategy.

**Further Research**

Even though we believe Sustainability Analysis is a major advance in the (IT) Strategy field, there are a number of developments in the strategy literature that warrant evaluation for the IT strategy domain. We believe that further research should be directed at exploring such new developments and considering implications and extensions for IT Strategy. Examples...
are “commitment” and “lock-in” [26], evolutionary views of strategy [49], or ecology theories of competition [28, 59], Santa Fe Institute’s research into complex adaptive systems [41], hypercompetition [20], research into dynamic capabilities [65], absorptive capacity [15] or other learning-based research [30, 36], or the knowledge-based theory of the firm [45].

References


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