INFORMATION TECHNOLOGY AND MANAGEMENT STRATEGY

by

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Introduction

If one theme has captured the imagination of business writers in the last several years it is the way Information Technology (IT) has been used as a competitive weapon and even to restructure industries. By now, almost everyone is familiar with American Hospital Supply, the company that installed terminals in their client's offices permitting them to provide better service in supplying medical goods, at a reduced cost, and, at the same time, locking in their customer base. AHS's position as the dominant firm in their industry is attributed to this strategy.

Does it really happen this easily? Do executives scan the environment looking for opportunities to apply information technology? Is top management really tracking technology? Are firms likely to be any better at capitalizing on the use of IT to achieve strategic objectives than they are at building normal information systems[1], or for that matter, accomplishing any strategic goal?

In this paper, the evolution of the notion of using information technology to accomplish strategic objectives is traced. Second, the literature on organizations and strategy is examined to identify some critical questions involving the use IT. Then, the major themes of the book are introduced.

Strategic Use of Information Technology

Gorry and Scott-Morton were some of the first authors to recognize distinctions among information systems [Gorry 71]. They arrayed them by managerial activity[2] and

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[1]One study found that well over 60% of the projects that complete feasibility study phase end in failure.

[2]Strategic planning, management control, and operational control were the categories used to represent managerial activity, following on work by Anthony.

the types of decisions involved[3] pointing out that areas of most concern to management were unstructured decisions. They argued that the greatest payoff to organizations occurs at a strategic level where problems are rich in ambiguity and uncertainty. Decisions at this level are highly leveraged, improvements could have a high payoff for things that really matter. This work led to the recognition that Decision Support Systems (DSS) were distinct from normal data processing ones. Gorry and Scott-Morton's focus, however, was on using computer technology to improve managerial decision-making through a process of model building and learning. If a competitive advantage occurred as a result, it was coincidental.

In 1982, Hank Lucas and Jon Turner observed that information technology can be used to achieve strategic managerial objectives in three fundamentally different ways [Lucas 82]. First, it can be used to obtain greater *efficiencies* in existing operations, for example, in reducing variable costs (decreasing marginal costs) through automation of routine activities, or in improving services to clients through better use of information. Then, it can be used to improve the *strategic planning process* by the development of policy analysis support systems. Finally, technology can be used to open *new markets* through the development of novel products or services that rely on or incorporate technology directly. Although the authors identified many of the factors involved in executing these strategies, the focus was still technology, stressing (or classifying) the way it was used.

Greg Parsons noted a year later that if information technology was to become a viable competitive weapon, senior management would have to understand how its use impacted the competitive environment and the strategy of a firm [Parsons 83]. He identified three levels of interaction. At the *industry* level, IT can change the products and services offered, the markets and the economics of production through fundamental changes in processes. At the *firm* level, IT affects relationships among buyers and suppliers, influences substitution, acts as a barrier to new entrants, and is an arena in

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[3]Structured and unstructured were the classes of decisions, based on work by Simon.

which rivalries can be contested. Finally, at the *strategy* level, a firm can use IT to become a low-cost leader, to differentiate its products from others in the field (usually by incorporating technology into them, for example as a control element or to provide a display), or to customize the product so that it satisfies a market or product niche. The significance of Parsons work was that it shifted the analytic perspective away from technology to a firm's strategy and that he incorporated the vocabulary of strategic planning.

Warren McFarlan expanded on this theme by observing that information technology can add value to products and be used to throw competitors off balance [McFarlan 84]. The issue, from his perspective, is *searching for opportunities*. IT can be used to build barriers to entry. IT can change the balance of power in supplier relationships and generate new products. IT can be used to build in switching costs and to change the basis of competition. Here McFarlan, as Parsons had done, directly links technology to Porter's three categories of competitive strategy: cost based, product differentiation, and market niche [Porter 79].

Porter clarifies many of these issues in his paper on how information technology can be used to obtain a competitive advantage [Porter 85]. Information technology is conceived even more broadly as *information* a businesses creates and uses as well as the wide spectrum of increasingly convergent *technologies* that process this information. Porter uses the notion of a "value chain" to describe ways IT can reshape the process by which companies create their products as well as the products themselves. An important concept here is that of "linkages" where the way *one* activity is performed affects the cost, or effectiveness of *other* activities. By managing these linkages, a firm can gain advantages, often by passing costs on to others, who come either earlier or later in the value chain, such as suppliers or distributors, or through fundamental alteration in the process of production. Porter insightfully observes that every value activity has both a *physical* and an *informational* component. While the tendency has been to focus more on management of the physical activity, information and processing associated with a value activity has many unexplored opportunities for advantage -

sometimes even being sold as a separate product.

Porter's focus on information and how it can be constructively used for advantage is an important contribution. Not only does it shift the major interest away from technology itself, but it ties the thrust back to original decision-making themes. It is, of course, the information provided by technology that is important rather than the technology itself[4].

Williamson suggests that there are two basic ways of coordinating organizational activity [Williamson 75]. *Internal hierarchies* can be used to establish price, quantity, quality and schedule for a given product. In this case suppliers are not selected from a group of potential candidates; they are directed by management. Conversely, an *external market* can be used to determine suppliers based on their ability to meet cost, quantity, quality and schedule objectives. This approach uses traditional market mechanisms of supply and demand to provide information for selection and coordination.

Relatively little information is needed to accomplish coordination with hierarchies because choices are limited and predetermined. In this case production costs tend to be higher without competition to drive them down. With external markets, considerable information must be gathered and processed to identify appropriate suppliers (and control them). As a result of the competitive market mechanism, however, production costs will be less. Thus, a trade-off exists for a firm between costs of coordination that are primarily information processing and cost of production [Malone 86].

In summary, the field has moved away from classifying uses of information technology to an inspection of all aspects of a company in search of opportunities to apply information to gain a competitive advantage. While this is an impressive shift in perspective, it does raise some difficult questions given the current understanding of

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[4]However, as Lucas and Turner observe, this presumes an organization has control over its technology and can shape it to achieve desired objectives.

how organizations function.

An Organizational Perspective

Literature concerned with the strategic role of information technology has largely ignored the organizational context in which *all* strategic planning must be done. While it is valuable to recognize the potential role which information and information technology may play in organizational life, and it is useful to study selected cases where IT has had a powerful strategic impact, fundamental questions remain: How do organizations conceive of and implement strategic plans of any sort? What do we really know about strategic planning in organizations?

Virtually all of the literature on the strategic role of information technology cited above assumes that organizations are rational goal seeking entities composed of more or less like minded persons who share goals and who work cooperatively towards common aims. Internal environments, in this view, are largely supportive. When they change, organizations adapt by anticipating them and then carrying out change programs [Zaltman 73].

This venerable and sanguine view of organizational life tends to overlook some powerful findings of organizational research in the last 25 years. First, organizational action is in part determined by the outcome of political struggles among factions and personalities within organization [Allison 71]. The ability of an organization to perceive correctly a changing reality and adopt "the right" strategic plan or technology depends on the outcome of these clashes.

Second, organizational action, including any planned strategic use of IT, is largely constrained by bureaucratic routines honed over many years of practice. These routines do not change rapidly [Hannan 77]. Organizations tend to respond to changing environments (internal or external) by doing more of the same thing as long as possible until, often, it is too late. A strategic plan, then, tends to reflect not so much what the organization should do under ideal conditions, but rather what the organization is

prepared to do given the kinds of trained specialists, bureaucratic units and routines available.

Third, the perceptions which organizations and their leaders have of the environment are heavily influenced by powerful, unstated cultural assumptions about the nature of the business, employees, products, customers and suppliers [Schein 85]. The ability of organizations to correctly perceive the environment, to correctly adapt by forming reasonable strategic plans, is therefore circumscribed by these bedrock cultural assumptions.

Last, there is an important sense in which organizational life is random, or subject to dynamics and developments which appear random. Issues and problems arrive in organizations in unplanned, unpredictable sequence. Solution producers - all highly trained specialists - are ever searching for new areas to practice their preferred brand of solution [Cohen 72]. Time driven events and routines activate various decision-makers and force action. Decision-makers often attach solutions to problems in a haphazard manner resulting in a series of uncoordinated movements [Starbuck 83].

The view of organizations that emerges from this body of research is that what organizations actually do is often unreflective of their environment and often not the right thing at the right time. Most organizations fail, and very few of them live longer than a human life time [Hannan 77, Starbuck 83]. What organizations plan to do (the formal strategic plan) is usually very different from what they actually do (the emergent plan) [Mintzberg 85]. Virtually all empirical research on strategic planning has found that organizations which engage in strategic planning do no better (in any measurable sense of the term "better") than firms who do not practice it [Grinyer 75][5].

On the other hand, this brief review of organizational research raises some troubling questions for researchers and managers engaged in the strategic use of

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[5]This may all turn out to be a great blessing. If organizations actually carried out their five year strategic plans, they would have to ignore important environmental changes which occur in shorter time frames.

information technology. First, how can organizations discover appropriate strategic opportunities, some of them involving the use of information technology? Second, how can organizations develop the necessary political and bureaucratic support to implement strategic IT investments? Third, how well does the strategic planning cycle for IT fit with that of the firm? In other words, how does the input, process, time line, and output of IT strategic planning mesh with that of the normal planning process?. Is it possible, or even desirable to closely coordinate strategic IT investments with the plans of the firm? Finally, where in the normal strategic planning process does consideration of the opportunities presented by IT take place and what is necessary for this to occur? It is these issues that the authors represented in this book address.

Research Issues

The field has moved from a perspective of classifying the strategic uses of information technology to describing its successful strategic application. It is time, however, to go further and ask deeper research questions about the process by which these outcomes come about.

There is a tendency to think of technology as the driving force behind strategic applications of IT. The notion set forth in the literature is that decision-makers sit around inspecting the value chain and linkages searching for opportunities to apply IT in order to gain competitive advantage. This view may place undue emphasis on IT and certainly it is top down. In actual fact, IT may well play much more of a secondary role. The strategic application may well be the result of a keen analysis of business needs. It could also be that really good IT applications come from the bottom up fighting to overcome social inertia, gathering political and popular support along the way, a thought consistent with studies of other innovations. Consequently, it is important to learn much more about how strategic applications were *conceived*.

Second, given the results of organizational research into strategy formulation, much more careful analysis is needed on just how strategic IT plans were, in fact, *implemented*. There is a general lack of attention, in the existing literature, to this

process.

Third, much more information is needed about *failed* strategic applications of IT. There have indeed been some colossal ones: Federal Express' ZAP MAIL, IBM's and Merrill Lynch's stock quotation system, and the IBM-Aetna Satellite Business Systems venture, to mention a few. It may be much easier to identify the causes of failure than to agree on those factors which lead to success[6].

Finally, the implicit model behind much of the literature is that building strategic applications is an example of purposeful, goal directed behavior. There is some indication that the strategic use of information technology has an opportunistic component. Projects started for one purpose often end up being used for a totally different one. It is not at all clear that American Airlines built Sabre with the notion of controlling the flow of information to travel agents thereby promoting their own flights over the competition. More likely, they decided to replace some of the manual record keeping supporting their counter staff for purposes of improved accuracy and timeliness and then, slowly, began to realize the opportunities the system presented for being used in a competitive (strategic) manner.

Sabre probably wasn't built because deregulation was anticipated, but it did permit American to have the information needed so they could experiment with many different fare structures and optimize their return. American Hospital Supply - often touted as the premiere example of the planned use of strategic systems - actually evolved a number of systems slowly over a long period of time. In reality, strategic uses of information technology may require supportive cultures to thrive, may have to be nurtured for quite a while, and may need heavy commitments of human and financial resources.

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[6]The research approach, currently in vogue, of describing successful applications of IT as cases is misleading because it over emphasizes successful outcomes. Cases, which tend to be written after the fact, aggrandize successful results, rationalize behaviors and infrequently capture tensions and negative events. As such, they can present a distorted and misleading view.

Plan of the Book

The articles in section II, the first portion of the book describe the organizational context or setting in which strategic moves are made. Section III contains articles that illustrate specific implementations of strategic systems. Section IV covers important underlying technologies and shows how they relate to the process of strategy formulation.

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