

# Information Technology Systems for Competitive Advantage

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## ABSTRACT

This paper explores means of realizing strategic opportunities through information systems. Using basic concepts of strategic information systems for competitive advantage firms can assess industry and company characteristics and the impact of the company's competition, assess its product/service value chain and seek value added products/services.

**KEYWORDS:** IT Advantage, Competitive Advantage, IT systems advantage

## PORTER'S "COMPETITIVE ADVANTAGE"

In his books, Porter says that there are two central questions in competitive strategy:

1. How structurally attractive is the industry?
2. What is the firm's relative position in the industry?

[8] Porter (1981) states that the principal types of competitive advantage are low cost producer, differentiation, and focus. A firm has a competitive advantage if it is able to deliver its product or service at a lower cost than its competitors. If the quality of its product is satisfactory, this will translate into higher margins and higher returns. Another advantage is gained if the firm is able to differentiate itself in some way. Differentiation leads to offering something that is both unique and is desired, and translates into a premium price. Again, this will lead to higher margins and superior performance.

Another point of Porter's is that competitive advantage is gained through a strategy based on scope. It is necessary to look at the breadth of a firm's activities, and narrow the competitive scope to gain focus in either an industry segment, a geographic area, a customer type, and so on. Competitive advantage is most readily gained by defining the competitive scope in which the firm is operating, and concentrating on it.

Based on these ideas of type and scope, Porter gives a useful tool for analysis, which he calls The Value Chain (Figure 1). This value chain gives a framework on which a useful analysis can be hung. The basic notion is that to understand competitive advantage in any company, one cannot look at the company as a whole. It is necessary to identify the specific activities, which the firm performs to do business. Each company is a collection of the things that it does that all add up to the product being delivered to the customer. These activities are numerous and are unique to every industry, but it is only in these activities where cost advantage or differentiation can be gained.

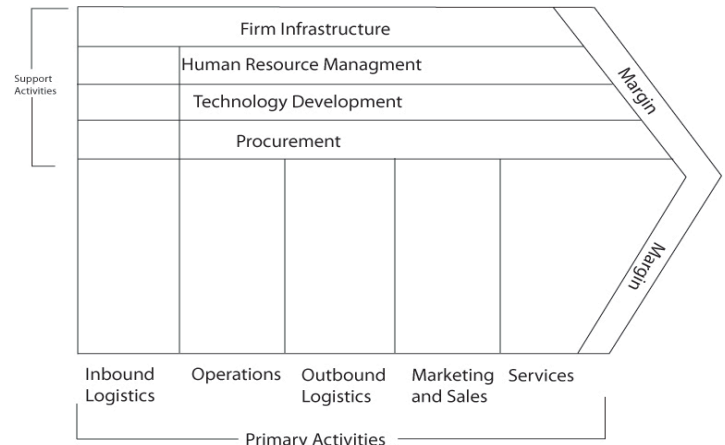


Figure 1. The Value Chain

The basic idea is that the firm's activities can be divided into nine generic types. Five are the primary activities, which are the activities that create the product, market it and deliver it; four are the support activities that cross between the primary activities. The primary activities are:

1. Inbound Logistics, which includes the receipt and storage of materials, and the general management supplies.
2. Operation, which are the manufacturing steps or the service steps.
3. Outbound Logistics, which are associated with collecting, storing, and physically distributing the product to buyers. In some companies this is a significant cost, and buyers value speed and consistency.
4. Marketing and Sales includes customer relations, order entry, and price management.
5. After-sales Services covers the support of the product in the field, installation, customer training, and so on.

1. Procurement, which includes the contracting for and purchase of raw materials, or any items used by the enterprise. Part of procurement is in the Purchasing Department, but it is also spread throughout the organization.

2. Technology Development may simply cover operational procedures, or may be involved with the use of complex technology. Today, sophisticated technology is pervasive, and cuts across all activities; it is not just an R&D function.

3. Human Resource Management is the recruiting, training, and development of people. Obviously, this cuts across every other activity.

4. Firm Infrastructure is a considerable part of the firm, including the Accounting Department, the Legal Department, the Planning Department, Government Relations, and so on.

The basic idea is that competitive advantage grows out of the firm's ability to perform these activities either less expensively than its competitors, or in a unique way. Competitive advantage should be linked precisely to these specific activities, and thought of broadly at a firm-wide level. This is an attractive way of thinking for most Information Service people, as it is, fundamentally, the systems analysis approach. Computer people are trained to reduce systems to their components, look for the best application for each component, then put together an interrelated system.

IT is also pervasive throughout all parts of the value chain. Every activity that the firm performs has the potential to imbed IT because it involves information processing. As IT moves away from repetitive transaction processing and permeates all activities in the value chain, it will be in a better position to be useful in gaining competitive advantage.

### **The "STRATEGIC PERSPECTIVE VIEW"**

The strategic perspective view [12] (Wiseman, 1985) emphasizes that companies have begun to use information systems strategically to reap significant competitive advantage. He feels that the significance of these computer-based products and services does not lie in their technological sophistication or in the format of the reports they produce. Rather, it is found in the role played by these information systems in the firm's planning and implementation in gaining and maintaining competitive advantage.

IT is now in a position to be exploited competitively. A framework must be developed for identifying strategic information systems (SIS) opportunities. There will certainly be competitive response, so one should proceed with strategic thrusts based on IT. These moves are just as important as other strategic thrusts, such as acquisition, geographical expansion, and so on. It is necessary to plan rationally about acquisitions, major alliances with other firms, and other strategic thrusts.

An effective SIS approach arises from the foregoing of new alliances that expand the horizon of expectation. Such an approach is most difficult to attain, and can only work with top management support. Innovations, however, frequently come from simply a new look of existing circumstances, from a new viewpoint. Information Services personnel must start to look systematically at application opportunities related to managers.

### **Strategic Thrusts**

There is no question that there is considerable overlap between conventional information systems and strategic information systems. Systems are complex and a great deal of data is involved. The idea is to look at this complexity in a new light, and see where competitive advantage might possibly be

gained. Wiseman takes Porter's three generic categories: low cost producer, differentiation, and focus, and extends them to five categories: differentiation, cost, innovation, growth, and alliance.

1. Differentiation can work two ways. First, it can be used to distinguish the product from the offerings of competitors. Secondly, there may be opportunities to use IT to reduce the differentiation advantage of your strategic targets. There are various differentiation opportunities in different industries. The development of marketing systems to help firms segment their markets is another form of differentiation. Whether the methods adopted are sustainable or significant can usually only be discovered over time.

2. Cost may be a move that not only reduces the costs, but also reduces the costs of selected strategic targets so that you will benefit from preferential treatment. A strategic cost thrust may also aim at achieving economies of scale. The examples always seem obvious when they are described, but the opportunities can usually only be uncovered by considerable search.

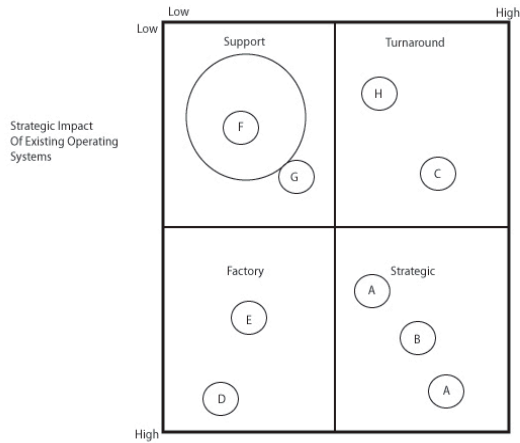
3. Innovation is another strategic thrust that can be supported or shaped by IT in either product or process. In many financial firms, the innovative product is really an information system. Innovation requires rapid response to opportunities to be successful, but this carries with it the question of considerable risk. There can be no innovation without risk, whether information systems are included or not. Innovation, however, can achieve advantage in product or process that results in a fundamental transformation in the way that type of business is conducted.

4. Growth achieves an advantage by expansion in volume or geographical distributions. It may also come from product-line diversification. Information systems can be of considerable help in the management of rapid growth.

5. Alliance gains competitive advantage by gaining growth, differentiation, or cost advantage through marketing agreements, forming joint ventures, or making appropriate acquisitions.

### **IT AND COMPETITIVE STRATEGY**

The systems with the greatest impact have been those that develop computer communications links between suppliers and their customers. These links offer the opportunity of competitive advantage. At the same time, they create a strategic vulnerability, as the improved operational systems cause vastly greater interdependence. For example, it becomes much harder for manufacturers to change suppliers. If such computing is effectively managed, however, there is a potential for forging new offensive tools, which can enable significant and lasting gains to be achieved in the market share.



- A. Major Banks
- B. Major Insurance Company
- C. Medium-Size Grocery Chain
- D. \$100 Million Distributor
- E. Major Airline
- F. Major Chemical Company
- G. Major Process Industry Manufacturer
- H. Insurance Broker

**Figure-Strategic Impact Information Systems**

Figure 2,[6] (McFarlan et al, 1983) Strategic Impact – Information Systems, is a strategic grid, developed and described in “The Information Archipelago.” It shows the position of Information Systems in various types of companies. In a number of organizations, there may be agreement that their firm is located on the left-hand side of the grid in either the support of factory quadrants. They have handled their staffing, organization, and planning activities accordingly. However, the dramatic changes in IT and the evolving competitive conditions in the industry may pose a danger that this categorization is wrong. In the new conditions, the competition may have developed new ideas using IT that are superior in the market. It may well be very difficult and expensive to rapidly match these new approaches, yet the whole game has been changed. It may well be that a firm can comfortably and profitably remain in the support and factory boxes. There have been dramatic and sudden technical changes recently, however, particularly with the possibilities of end-user computing, and Information Systems should periodically review their position and the competitive strategy of the firm. This is a subject that needs regular review.

Information Systems can be strategic and affect the profitability of the organization. There are several ways listed below in which IS can enable cost reductions that could be strategic. There are also several ways listed in which IS could have the ability to provide necessary product differentiation.

Information Systems can be low cost if they:

1. Enable major reduction production/ clerical staff.
2. Enable better utilization plant/fixed assets scheduling, better maintenance.
3. Enable sharp reduction in inventory levels, accounts receivable, etc.
4. Enable material efficiency, improvement.

5. Can change the basis of competition from cost to sustainable product differentiation.

Information Systems can provide product differentiation if they have:

1. Ability to deliver unique product features
2. Ability to sharply reduce development cycle.
3. Ability to deliver radically more customized product.
4. Ability to open new channels and uncover new market niches.
5. Ability to produce significant higher quality levels.

6. Can be a business system by itself

The IT itself, and the use of end-user computing, can sharply increase the value-added of a product or supply a completely new approach. One cosmetics firm has 10,000 registered consultants. The consultants pay about \$750 for the service and buy the products. The firm knows the consultants, but does not know the end customers. They, therefore, paid for the names of the customers who made purchases and created a large base for telemarketing. If a customer now pays over \$50 for her products, she gets a magazine via direct mail. They also have systems to key in individual analyses. A few days later, a beauty care recommendation is automatically sent out. This includes customized, individually prepared beauty care creams, with the customer’s name engraved on the glass, at about one third the price of competitive offerings.

**STRATEGIC IT MANAGEMENT**

[7]Parsons (1985), states that the objective of strategic IT is to use IT as a competitive resource. The management process itself involves analytical frameworks and approaches for achieving strategic competitive advantage with the use of IT. The family of existing, emerging, and potential information technologies are in the areas of:

1. Data Processing, Mining and Warehousing
2. Telecommunications
3. Office and Professional Support
4. Decision Support Analysis and Decision-Making
5. Production Control

**Industry Level:**

IT can impact the entire industry structure. For example, in the banking industry with deregulation, IT has become one of the major components of change.

**Firm Level:**

IT will impact the specific competitive environment of the firm. It occurs when a company looks out at the specific competitive forces that it faces, and realizes that technology is changing these forces for that firm.

**Strategy Level:**

IT or IT impacts that firm’s competitive strategy by allowing it to change, enhance, or further its own strategy.

## ALIGNING INFORMATION SYSTEMS WITH CORPORATE STRATEGY

The reasons to invest in automation and IT include both improving competitive position and improving business operations. Both may be involved in strategic planning, depending upon the current position of the corporation. A strategic systems planning effort, therefore, has two main phases. Phase I is the strategic systems opportunity analysis, which examines the business thrust and asks what should be done with automation. Phase II is the strategic systems planning work, which finds out how to position the systems resources to aid the business thrust, or how the EDP momentum can be moved from operational effort to business growth effort.

Global competition has increased with a) reduced differences between countries, b) aggressive national industrial policies, c) more open flow of technology, d) emergence of more large scale markets, and e) emergence of newly developed countries. Deregulation and denationalization have increased competition. Technology has a) changed industry, enabled small firms to compete with big businesses and spawned new businesses. The increased use of a) computer aided design, engineering and manufacturing, b) advanced communication systems and data rich information systems.

IT provides a competitive edge particularly in scanning the environment for opportunities and threats, competitor behaviour, and ascertaining customer needs. Corporate strategy can then be formulated and this could lead to restructuring of the value chain and use the technology to a) influence buyers and suppliers, differentiate products, lower product and process costs, raise industry entry barriers to reduce destructive rivalry and exploit linkages in the value system. The technology enables direct linkage with the customer to differentiate the product at lower costs. It also enables a focus on target customer groups so niches can be served.

Therefore, IT and the Internet enable compound and versatile approaches to strategy. Encryption has been improving to reduce fraud. Barua<sup>1</sup> (2000) states that the IT industry (including the Internet) has surpassed any other industry in terms of investment and business transactions (Industry business from \$3 million in 1993 to 80 Million in 1999 to 301 Billion by 2000). The transforming power of IT is particularly seen in Finance [2](Cohan & Schwartz, 2006). IT has also transformed accounting.

Big middle retailers serve mass markets composed of mainstream customers. They fight for market share and leveraging technology helps in the competition as [9]Sethuraman and Parasuraman (2005) state with emphasis on the following,

1) most technological advancements in retailing in the twenty first century will relate to IT, 2) many technologies have the potential to cut the cost of retail operations and enhance service

to customers, 3) the adoption of these technologies requires significant upfront investments, 4) successful retailers looking at this mass market would have deep pockets to adopt these technologies and pass on part of these costs to their vendors, 5) these retailers need to take a long term view on returns to their technology investments, 6) Big middle retailers should consider customer reactions to these technologies and be cautious about “over engineering.” Astute IT management was integral for Home Depot’s profit growth and growth in size from the 1980s to 2005 –A \$2.4 Billion organization with 100 stores to \$54 Billion with 1,300 locations worldwide[4] (Griffin, 2005). American Modern Insurance Group Inc. found its systems weren’t keeping pace with its changing needs and invested \$62 million in IT to meet its needs[11] (Ulfelder, 2006). [3]Gartenburg (2006) finds that IT defines business as in firms like Amazon.com. Entirely new businesses have emerged that are totally defined in terms of technology. It is noted[10] (Songini, 2006) that IT must be subservient to business processes and that Chief Information Officers or those responsible for implementing the technology should ensure that IT departments contribute to the bottom line.

[5]Johnson (2005) provides a brief listing of useful technologies, Voice over Internet protocol for lower costs and higher efficiency as firms switch their telephony systems from wired to wireless, Paperless technologies that are a common feature of accounting systems, video conferencing that saves time, energy and commuting, Extensible Business Reporting data between systems over the internet more efficiently, Storage Area Networks that connect large capacity data storage devices with powerful computers serving communities of users, High definition digital video disks and Blu-Ray disks with rewritable optical media with large data storage capacity, improve wireless technology that has reduce static interference and security gaps, Radio Frequency Identity tags contain important tracking information on objects and freight parcels, Broadband over power lines brings high speed internet to every home. This is also a boon to small family business. Satellites are the high altitude air ships provide a variety of communication services. The are cheaper to launch and maintain than satellites, Grid Computing links processing power and data storage resources of many computers in networks dedicated to fulfilling joint goals such as serving a community o users, offering large quantities for shared power, system security continues to improve with small key like devices to replace password, software improvements in virus protection and anti hacking.

The older paradigm talked about firms that were “built to last” though many of the firms so identified have struggled or dropped out of competition, the new paradigm is “built to change” as IT and the internet enables firms to be nimble and flexible while gathering and processing information from the environment and the customer in real time to make good strategic thrusts to capture market share. If IT is commoditized and can be obtained off the shelf will it level the playing field? [1]Carr (2004) suggests that the smartest users of technology stay back from the cutting edge to make their purchases till standards and best practices stabilize and prices fall. He cites Wal-Mart in 2003, as it required top hundred suppliers to “tag” merchandise with Radio Frequency ID chips and transmitters at the suppliers expense to assist in retailer inventory control. Security reaches, technical glitches and other operational problems will occur so IT purchasers should focus more on vulnerabilities than opportunities.

A brief look at some companies or industries that have used IT for a competitive advantage shows that a new paradigm in

<sup>1</sup> Anitish Barua interviewed by Margaret Warner on the News Hour with Jim Lehrer, June 2000, spoke on his research on IT and Internet growth at Texas A&M University. The research was sponsored by Cisco Systems

business has emerged. IT has improved Strategic Planning Implementation and management controls. This paradigm has enabled even small and medium sized businesses to be competitive with larger ones.

American Airlines spent \$300 million in the 1970s to get an excellent reservation system and it was an information system that was structured for its need at that time such as efficiency, capability and rapid response time for their reservation clerks. Long after, along with United Airlines and its Apollo reservation system, the Sabre system became the principal distribution systems for airline reservations. Similarly, the American Hospital Supply system had a later positive impact that was not envisaged when it was built, IBM's Business Systems Planning and Business System Information Planning became a major revenue earner for the firm through its "Business Solutions" offering. Price Waterhouse's Strategic information Systems Planning had given it a competitive edge in the financial industry but surges in investment in the late 1990s found most systems in the financial industry unable to cope with the exception of Schwab whose planning seems to have been strategically more advanced with enough capacity for memory and processing that many investors turned to Schwab and away from their usual banks/institutions to get

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their investments in, while prices were low. Amazon .com revolutionized book purchasing and seeks to enlarge its offering. Its technology can be expanded to be the Wal-Mart of the Internet and eat some market share from Wal-Mart itself. Wal-Mart's supply chain was revolutionized by IT. eBay enjoys first move advantages as an online reseller and auctioneer. Micropoint has allowed customers to buy cars over the Internet. In 2004, amidst allegations from China that The US will decline economically because of mismanagement, I suggested to students that it is time for the middle and lower classes in the US make their voices heard and elect someone who can and will work for them. Students replied that such a person usually is not from the ruling elite and so will not have the money to compete with the ruling elite to enter the white house. I countered that the middle class and lower can, with small contributions match the financial competition from the elite provided the candidate is the obvious choice from these two classes. Students were skeptical that it could be a reality. IT and the Internet contributed to the reality in the Presidential election 2008 to achieve something not probable anywhere else in the world.

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