Business Information on the Desktop:
Alternatives to Paper-Based Reporting

This paper outlines how information technology can provide a competitive advantage and is based largely upon the theories of Michael Porter of Harvard Business School. Porter said that rapid technological changes in information systems is having a profound impact on competition and on competitive advantage. I would like to begin by showing you why we think information technology can have strategic significance and then move into a brief explanation of how it changes the nature of competition.

We feel that information technology has strategic advantages for two reasons. The first reason is that it transforms what Porter calls the value chain. It can actually alter the activities that a company performs in a couple of ways. Porter defines the value chain as all the economical and technological processes or activities that a firm undertakes to produce its product, and these activities are all related to one another in what we call a value chain. Think of the product from a concept until the product goes out the door (whether it is a tangible product or a service) as the sum total of the number of incremental steps in the entire process. Each of these distinct activities has its own cost driver or its own associated processes with costs. One of the ways to understand what a company does is to look at all those individual steps. Within those steps, two kinds of processes occur. One is information processing and the other is physical processing. By information processing I mean individual steps of data collection, manipulation and communication of information.

For example, an MPR system is a mechnism for tracking the information processing portion of producing a product. Physical processing is simply the manufacturing of the product. Information technology has entered physical processing in products like machine tools which are now operated with computer controls. In summary, information technology has entered the workplace along that value chain in a number of different areas during the process, one of which is information processing and the other is in the physical processing.

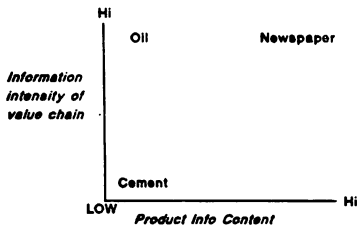
The other area that has provided significant strategic advantage is where value chains can be linked. For example, McKesson Drugs has put terminals in their drugstores right on the pharmacists' desks. The pharmacist can check McKessons inventories, in fact check their own orders against McKesson. It used to be that the sales rep would visit once a month or every two months, now McKesson Drugs has actually provided the pharmacist with on-line information. What they've done is linked their activities together and in this way we find that information technology is providing strategic significance, in fact transforming the way businesses operate.

To summarize we really see the value chain being transformed. We see it being transformed in terms of information processing, physical processing, and the linkages between value chains of different organizations.

The other way that information technology is providing strategic advantage is that it is actually transforming the products themselves, not just the processes but the actual products. An example might be a product like Compustat which is a product that could not have existed several years ago because the information technologies did

not provide the distribution mechanism. Another example would be be my dishwasher which came with a micro chip in it and now it has enough information bundled with it to tell the difference between pots and pans and china. Electronic fuel injection in automobiles is another example. Information is transforming whole products.

So we have two significant things happening --the whole value chain and the way companies are building their businesses is changing, and we have products that are changing. Two key trends emerge from these facts. The information content of products is increasing and the information content of the value chain is rising, providing more and more opportunities to insert into this process information processing. See diagram below for examples:

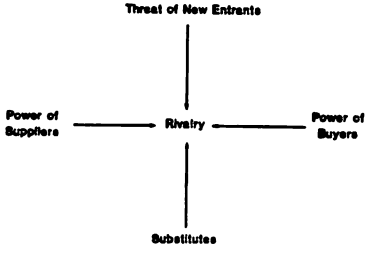


A product for which the processing (either service or tangible product) is very complicated and involves a lot of information is oil. The refining, locating, and delivery of oil is very sophisticated. For example, the information technologies that are being applied to squeeze more oil out of the ground and so forth. But, the actual information content of oil is very low so it falls on the left side of the scale. Cement on the other hand, is an example of a product that has low information processing content and also low information within the product

itself. Cement, like oil, doesn't have any information associated with it but the processing of it is relatively simple - take a shovel of cement, 3 shovels of sand , add a little water and that's all there is to it. But note the quadrant containing newspapers. Here you have a product that has a lot of information and also the processing of it is very complicated. For example, USA Today has 17 distribution outlets and they transmit, electronically, information to each of those sites to publish the newspaper. The process to get your USA today is very complicated as well as the product itself having a lot of information.

To highlight two key trends, the value chain or the processes that companies use to produce their products are more and more beginning to have more information content and also the products today also are beginning to have more information built into them. I feel these are the reasons why information technology can have strategic benefit, because it can transform products in these two areas.

Let's briefly look at how information technology can change competition and the structure of an industry. Relying on Porter's Five Factor Analysis of an Industry, the forces listed on the following diagram all act together to determine an industry's structure.



The following examples demonstrate how information can disrupt an industry that has been traditionally stable. Some examples in each of the five areas:

The Power of Buyers - We have seen some examples of this with Videotech's Home Teleshop where you can actually order products on your television. This has changed the whole picture for the distribution channel in the department store. Another example would be on-line mortgage services when you buy a house and can get information on-line about potential mortgages that are available. The last example might be the airline reservations system used by many airlines including United and American which provides on-line information to travel agents on all their flights, and this has really changed the structure of the industry. Suddenly consumers have much more information about buying and as a result more bargaining power. Technology here has disrupted the industry in some fashion.

The Threat of Substitution - A good example here is LEXIS an on-line database product that provides database access to legal information. Large volumes of legal information are put on ROM discs and provide key word search to alter the way in which legal information is delivered. By putting information on discs, they are in a sense becoming substitutes to the traditional legal publishers. So, again, technology changing the nature of the business.

Bargaining Power of Suppliers - A good example here is again McKesson where a supplier has locked up a distribution channel, the pharmacists, by providing a terminal right in the pharmacy. They have created switching costs so that if the drugstore wanted

to change suppliers they would have to locate someone else, change terminals, hook the new suppliers equipment up and would likely encounter some problems in terms of their transition.

Threat of Entry - The best example here might be Merrill-Lynch's Cash Management Account. Merrill-Lynch has developed entry barriers by instituting a cash management account where you actually call up and receive a complete rundown of you account. They have errected barriers for other corporations that want to have cash management accounts because of the massive technologies in place in order to provide that on-line service for the account managers.

Rivalry Among Competitors - One of the best areas to look at this is in the distribution businesses. Distributors have implemented technologies to achieve more rapid and accurate distribution, tieing themselves to suppliers, and being able to speed-up deliveries. In fact some trucking companies have provided on-line services that allow firms that are expecting a delivery to locate their shipment. As a result, these distribution houses have developed high fixed costs. To cover these costs, businesses have expanded markets and intensified competition and rivalry.

So as you can see, technology can affect industry in a number of different ways and we believe that technology can have significant strategic advantage. Porter summarizes this by saying that there are three key ways you can create competitive advantage in your business. The first one is to reduce costs. An excellent example of this is Caesars Place, where they have instituted an information system which tracks who their high rollers are. They are able to provide services such as free rooms, complimentary dinners and so forth to just those

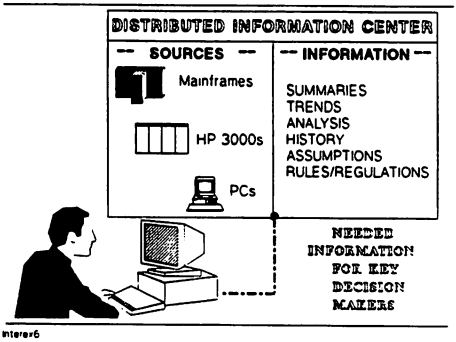
people whom they know are high rollers. So with information systems tracking, they are able to reduce their costs of supplying high rollers with the services they require and at the same time build their business.

The second key area that Porter points out is differentiation. Information technology can help you differentiate your product. The Merrill-Lynch Cash Managament Account and American Express Travelers Services where American Express has targeted specific business travelers and provided new services for them are two good examples of differentiation.

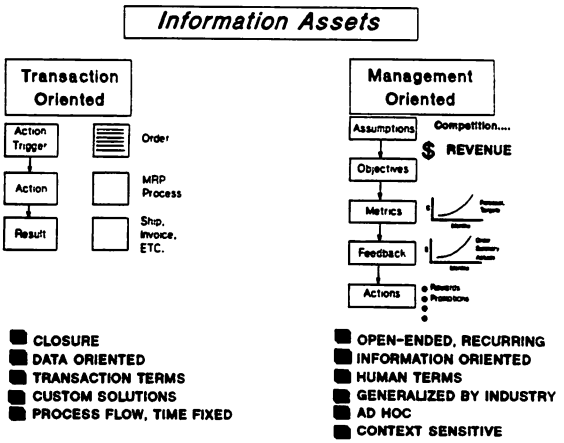
The third area is that information technology can actually spawn whole new businesses. Here, USA Today is a good example; you could not have a national newspaper until you have the capability of distributing information electronically.

What does this mean for you? If you want to analyze your industry to determine whether you can develop advantages through technology , look at just a couple of things. The information intensity of the industry, both in processes and in products, and the trends associated with the information content of your product. If you can assess that and determine that there is a high potential for information technologies to be applied to your business and then apply them appropriately, you can achieve competitive advantage. Do this five factor analysis to determine whether there is potential in your industry for structural change. Identify and rank the potential areas for you to acheive strategic advantage in your industry and then develop an action plan and implement it. With this as background I'd like to show how OSD Marketing institiuted strategic advantage through Information Access by developing an information center.

We define distributed information center as the pooling of information such that the information becomes more than just data.



It has context, it has meaning, it has relationship, it provides information for decisions so it goes much further than just meaningless datapoints. With that as background, let's explore some of the trends and the history of these information centers.

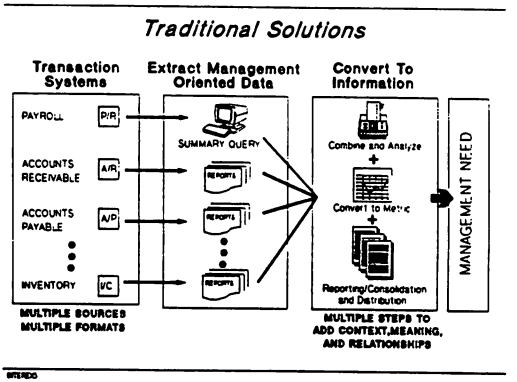


One of the key trends is the understanding of information as an asset. As an asset when information becomes pooled you can then adopt the objective of utilizing that asset to forward your business. Another trend is that the MIS manager once he has pulled this information can have strategic influence as a line manager within the business. No longer just a DP shop, now the MIS manager becomes important strategically for the firm in order to achieve the kind of advantage that Porter is talking about. Another key trend would be the recognition of the difference between transaction-oriented data and management-oriented data. Transaction-oriented data is the traditional data processing machine. It is a process that has an action trigger like an order coming in and has a series of actions such as picking list is filled out, the order is picked from the shelves and packaged and shipped, and then it has a closure or loop or which is the result which is invoicing and payment by the customer These traditional systems have had closure and are contrasted to what we are beginning to see as the emergence of the information center. These centers are open-ended and the processes that are involved in them are recurring and the data is being used by managers and doesn't have the action, trigger, results effect; it tends to be more open-ended. So the actions that are employed in information centers are on-going, dynamic, flexible, ad-hoc as we will point out later.

The data in transaction-based systems is usually coded. It has a number of digits and you don't know exactly what that data means. In other words, it doesn't have context, whereas, when you look at management-oriented systems (information centers), the data becomes informational - rather than a code 15 it's sales region, southern. Or, rather than A or B you know that it is the salary file. The data is expressed in human terms, understandable terms.

Another thing that has happened is that the solutions within within that value chain are less customized from a management perspective. Management has a higher level view of exactly what a company is doing, they need income statements and balance sheets. They don't have to worry about the individual processing that is occurring in each step of the value chain so rather than very customized solutions like a transaction-based system, they are generalized. Management-oriented systems have real ad-hoc ability, they are context sensitive So what has happened traditionally is we have moved away from these transaction oriented systems towards management-oriented systems. It has been slow, but it has been the foundation of the information center.

The graph below illustrates a traditional solution.



On the left, the traditional transaction system, closed loop processes which are just data and the tasks associated with trying to get that information to meet a management need are on the right. These generally involve multiple steps: it is reports, query screens, review

screens, etc. and it involves the manual rekeying of data into Lotus spreadsheets. You have to combine and analyze it to get it in terms you can use to make management decisions. These multiple steps resulted in a long and laborious task. What we are saying today today is that Information Access has provided the solution to that long task and provides management-orienated information which is pulled together in a contextual relationship such that you have a rational method of collecting, managing, and distributing information so that the information can be used to make decisions, expedite action and achieve competitive advantage. The information center becomes the first step in implementing a system by which you can support and achieve competitive advantage once it has been isolated within the industry.

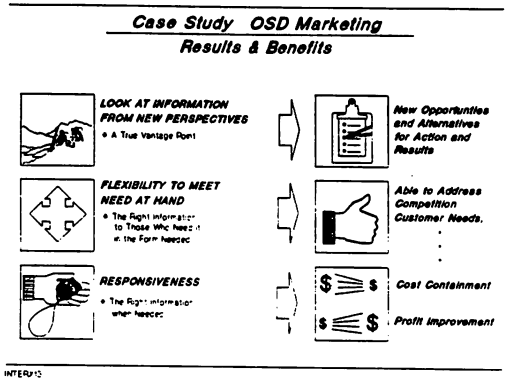
- Management Oriented -
THE INFORMATION NEED

- *A rational method of collecting, managing, and distributing information which gives us a clear focus to:*
  - *Make better decisions*
  - *Expedite action*
  - *Maintain quality*
  - *Evaluate results*

On a company wide, sub-entity, workgroup and individual basis

The implementation of this Information Center has provided a way for us in HP Product Marketing to look at our information from a totally different perspective. For the first time, because the Information Center has given context and relationship to the data, we know that

for instance, products are selling stronger in one region than in another. Or, we understand that discounting structures are causing discounts to occur at higher rates in one part of the country or the world than another, so we begin to get a whole new look at the data.



This ties into one of the three key things that Porter points out as ways of developing competitive advantage. It offers the opportunity to spawn new businesses or look at new ways of doing your business. You may have had an opportunity, for instance, to implement promotions based upon this new information you receive from this information center.

The second point is the flexibility of the information, the adhoc, dynamic, on-the-fly use of Information Access provides a way to differeniate our product. We can get the right information when we need it on a timely basis and if it's getting close to the year-end and we are under sales, we can execute a program to improve the situation. It enables us to look at our customers and see what type of customer is buying and how to differeniate the product.

For example, if we find that we are getting more sales in a specific segment, we can understand that and begin to better meet customers needs. That is Porter's second point, differeniate your product with information technology.

The last point is responsiveness - the timeliness of the information. A good example is a team of accountants who are using a Lotus spreadsheet format for summary reports. From an actual beta site, we found that by using Information Access to automatically link the data into your Lotus spreadsheets, we have been able to increase productivity from a 12 hour process to an hour and a half process. This really cut the overhead costs! So again, here is an operational application of the technology that provided a cost benefit. With all these things wrapped together we have implemented an information center that provides competitive advantage and allows us a different way to look at our business, achieve results and develop strategic opportunities.

UTILIZING DATA PROCESSING INFORMATION
TO SUPPORT MANAGEMENT DECISIONS

I) Information Technology = Competitive Advantage

A. Why does information technology have strategic significance?

1. Transforms the way value activities are performed.

* information processing component
  dfn: steps needed to capture, manipulate and and channel data to perform task (MRP), substitutes machines for human effort, ledgers give way to computers.

* physical processing component
  dfn: physical tasks required, computer controlled machine tools.

* linkage of buyers and supplies
  McKesson Drug
  JIT inventory

2. Transforming Products

* information component expanding
  LaserRom
  electronic fuel injection
  Compustat, SEC data

Value Chain Technological and economically distinct activities. Cost drivers for each. If total cost of value activities < price then a profit results.

Trends Information content of products is increasing
Information content of value chains is increasing

B. Changes the Nature of Competition

1. Changing Industry Structure

- power of buyers
  * Videotex home shopping
  * on-line mortgage services
  * American Airlines System Sabre

- substitution
  * LEXIS

- entry barriers

*Merrill Lynch, cash management account information

- rivaly
  * distributors increase fixed costs and displaced people, an increase in volume must result

- suppliers
  * tie McKesson to drug stores with in house systems (switching costs)

2. Creates Competitive Advantage

- lowers costs
  * Ceasors Place

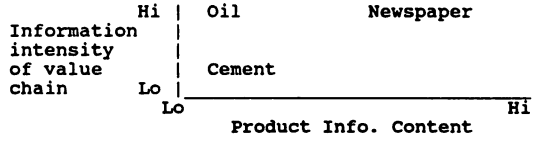
- differentiation
  * American Express Travel Services for custom products

3. Spawns new business

- Federal Express Zapmail
- USA Today

C. Competing in the Age of Information

1. Assess information intensity of product and value chain



2. Potential for Industry Structural Changes

- 5 factor analysis

3. Identify and rank ways information technology can provide competitive advantage or new business and implement..

II). The Information Center Technology can achieve competitive advantage

A. Definition of Information Center

- pooled, logically related data with context and meaning

B. Trends

- information is asset
- information is more than data, has context
- MIS has strategic roll
- software technology (I/A) allows information center to come out of transaction database.

C. Emergence of Information Center

- transaction vs management oriented data
- traditional solution
- what is needed!

D. Implementation Example

E. Results and Benefits - How Information Center has yielded New Business, Differentiation or Low cost

- New perspectives
- Flexibility
- Responsiveness