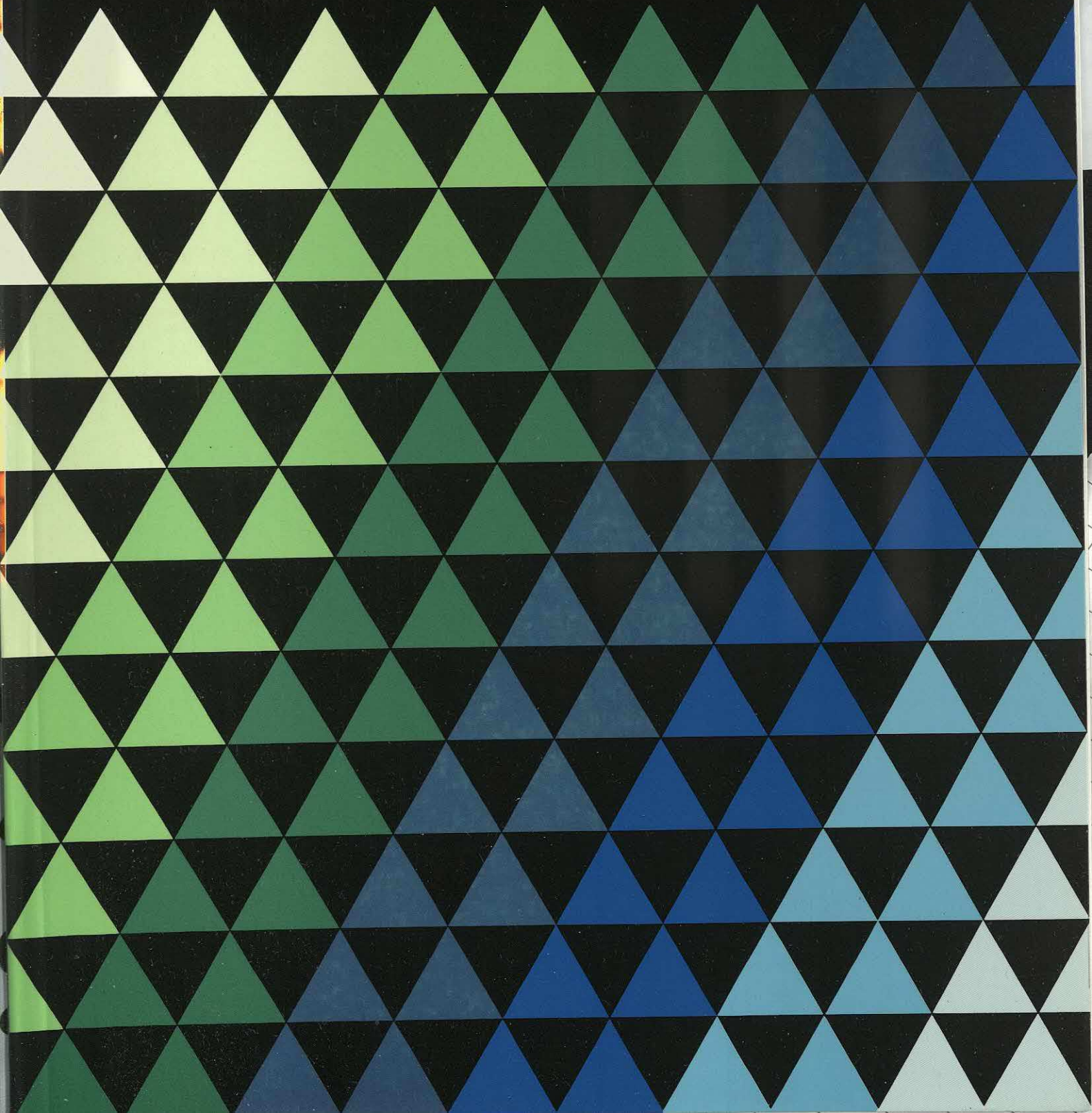
Electronic Marketplaces

BUTLER COX FOUNDATION

Research Report 77, November 1990



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Butler Cox plc

LONDON
AMSTERDAM MUNICH PARIS

Published by Butler Cox plc
Butler Cox House
12 Bloomsbury Square
London WC1A 2LL
England

Availability of reports
Members of the Butler Cox Foundation receive three copies of each report upon publication; additional copies and copies of earlier reports may be purchased by members from Butler Cox.

Photoset and printed in Great Britain by Flexiprint Ltd., Lancing, Sussex.

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Contents

A Management Summary of this report has been published separately and distributed to all Foundation members. Additional copies of the Management Summary are available from Butler Cox.

Report synopsis

This report is concerned with the potential impact of information technology on the operation of a wide range of marketplaces. New applications of information technology will increase the effectiveness of marketing and of purchasing, and this will alter the balance of power between buyers and sellers, and the role of business intermediaries. These developments will change the dynamics of markets, widening them and improving the availability of market information. They will also increase the responsiveness, and hence, the volatility of markets. Electronic marketplaces will benefit some organisations and harm others. Senior managers of organisations affected by the development of electronic marketplaces need to re-evaluate the basis on which they compete and the functions that they perform within the market. Systems departments, for their part, need to ensure that the design and implementation of their systems will help the organisation to compete in electronic marketplaces.

Chapter 1

Information technology will transform a wide range of markets

For most of their history, computer systems have been concerned with the internal operations of an organisation. Technologies such as electronic data interchange (which replaces order forms and invoices with electronic messages) are now enabling companies to extend their computer systems to their trading partners, thereby helping to reduce stocks and improve quality in manufacturing industries, or to reduce response times in the financial sector, for example.

Applications with the potential to alter the operation of whole marketplaces are starting to emerge, however. Examples range from the introduction of home-shopping terminals (see Figure 1.1, overleaf) and insurance quotation systems (see Figure 1.2, on page 3), to computerised tendering systems for government procurement. These developments will have a profound impact on the balance of power between suppliers and customers, and on the role of business intermediaries. The purpose of this report is to assess the impact that information technology in general will have on the operation of marketplaces.

We believe that information technology will, in the near future, affect all aspects of trading — it will assist in the process of identifying appropriate suppliers or customers, it will streamline the process of matching specifications to requirements, and it will facilitate the negotiation and agreement of a deal. The combination of all three will lead to the transformation of a very wide range of markets.

In economic terms, information technology will move many sectors closer to the concept of a 'perfect market' — that is, a market in which all participants are fully informed about all aspects of the market. (Figure 1.3, on page 3, explains the basic economic principles of markets.) Today, most markets are very imperfect, and many suppliers rely on the fact that their customers are not well informed about the market, because the cost of being well informed is too high. To some organisations, therefore, electronic markets will pose a serious threat. To others, they will represent a major opportunity.

The next few years will see three major manifestations of the concept of electronic marketplaces:

- Electronic marketing — the use of information technology to make marketing more effective.
- Electronic purchasing — the use of information technology to increase purchasing power.
- Electronic markets — the linking together of multiple buyers and multiple sellers.

It is essential that all senior managers understand each of these principal developments and the relationships between them. Applications for information technology in the marketing department, such as building customer databases or marketing-information systems, are currently receiving considerable publicity. We believe, however, that it is very risky for an organisation to apply information technology to its marketing without having considered how information technology could change the nature of its customers' purchasing process.

This report is intended to be read by senior line managers in marketing and purchasing, by senior systems managers, and by the main boards of most organisations, and has been written accordingly. Electronic marketplaces are not just something that stockbrokers and foreign exchange dealers have to worry about; they will develop in all major sectors of industry in the next few years. We have illustrated each of the

Figure 1.1 Consumer electronic marketplaces are tempting, but fraught with problems

Electronic home shopping is just one example of the concept of the electronic marketplace. Although the concept is not new, there are as yet few successful examples. One exception is the Florida-based Home Shopping Network, a cable television channel devoted to product promotions, which employs neither sophisticated technology nor sophisticated marketing concepts. It follows a simple formula of hard-sell, downmarket product lines, and impulse purchasing (subscribers have just 10 minutes to respond to each offer by telephone).

More interactive systems, such as videotex-based services, have so far failed to generate the level of interest forecast by their developers. J C Penney's Telaction, launched in February 1987, was expected to be an exception. Telaction used a combination of cable television and touch-tone telephones: the customer keyed in the required page, causing Telaction's Tandem computer to recall that page from videodisc and transmit it over the cable network. A frame grabber (shared between 15 houses in a locality) would intercept the page and display it on the customer's television screen. The aim of signing up 125,000 subscribers within the Chicago metropolitan area was never achieved, nor was the system ever franchised into other areas. In April 1989, J C Penney announced the closure of Telaction, after an investment of $106 million.

At the other end of the spectrum lie the PC-based shopping services. Such services operate against the so-called '25 per cent pyramid'. Of the estimated 19 million PCs in American homes, only 25 per cent have modems. Of these, just 25 per cent subscribe to an online service, and of those, perhaps 25 per cent use them on a regular basis. In other words, the 94 million homes in the United States quickly get whittled down to just 300,000 potential users. Not surprisingly, most of the successful PC-based shopping services cater to specialist interests. They keep their overheads low by operating within a more general online service such as CompuServe. Similarly, the French Minitel system, probably the most successful implementation of home-terminal links, has provided the infrastructure for a wide range of special-interest services.

One company seems determined to widen this interest. Prodigy Services Company, a joint venture between IBM and Sears, has reputedly consumed some $600 million in capital and 1,000 man-years of effort so far. A subscription to Prodigy costs $9.95 per month, and offers access to 175 main suppliers. Sears itself promotes between 2,000 and 3,000 items through this 'electronic store', although customers can order any of the 250,000 lines in Sears' catalogue through the system. The company's forecast for 1990 was to have 200,000 subscribers in 50 geographical markets across the United States.

There is clearly no formula for success in electronic home shopping, but the following principles appear to hold true across several examples:

Consumers are not prepared to pay up-front for the service

Prestel, British Telecom's pioneering videotex service, provides ample evidence for this — after 10 years in operation, fewer than 150,000 terminals have been sold. If a home-shopping service is not designed to run on existing equipment, the operators will probably have to give away the terminals (as in the case of France's Minitel) or at least rent them at low cost (as Singapore Telecom proposes to do).

The user interface is important

There is no doubt that high-resolution graphics (which necessitates higher bandwidth communication) improves the feel of a home-shopping service, but that is only part of the story. Although Prodigy uses only videotex standard resolution, the designers have paid considerable attention to the way that people use the system. In addition to conventional menu-driven access, Prodigy allows the user to jump directly to certain pages by typing in a keyword, and can also memorise often-used paths through the system.

The users must see a clear benefit over alternative purchasing channels

The fundamental problem with most electronic home-shopping services is that they do not offer any clear benefits over alternative purchasing channels, such as telephone ordering using a credit card. Even the notion of comparing prices is less attractive than it sounds, when telephone-based services such as Comp-U-Card already offer to locate the lowest price for, say, a Panasonic 19-inch colour television.

At the moment, electronic home shopping is really an example of a better electronic sales channel than of an electronic purchasing channel. For some types of product, it offers the customer an easy way to satisfy a demand created by other means (such as television advertising or direct mail), and for some suppliers, this will generate sufficient increased revenue to finance the full provision of the service to the customers.

When electronic home-shopping networks reach a critical mass, third-party markets and purchasing services will start to appear, and consumers may be prepared to pay realistic subscriptions. It is possible, though by no means certain, that Prodigy may achieve this critical mass. As this report went to press, however, a new contender appeared. Nintendo, the enormously successful Japanese video-game manufacturer, has announced its intention to address a more sophisticated market with new applications such as online broking services. Those who are sceptical would do well to recall Nintendo's meteoric rise at a time when all the US-based video-game manufacturers had written off the market.

principal developments with examples drawn from a wide range of industry sectors — from transportation to manufacturing, and from local government to financial services. Details of the research team and the scope of the research are described in Figure 1.4, on page 4.

Figure 1.2 Retail insurance in the United Kingdom is rapidly becoming an electronic marketplace

In the United Kingdom, most 'retail' insurance (insurance for private individuals and small businesses) is sold through insurance brokers — typically, independent retailers with high-street premises. Brokers are not tied to individual insurance companies, but sell products from a range of companies. The consumer insurance market is highly competitive, and has now seen several generations of information-technology-based services designed to make it easier for the broker to obtain quotations from insurance companies and to transact business with them.

The first services were provided by individual insurance companies, notably Friends Provident and Commercial Union. The systems were based on viewdata (videotex) technology and enabled the broker to obtain quotations online, but only from the insurer providing the system. Such systems provided primary benefits to the insurance companies, both in terms of increased business and fewer errors.

By 1986, these systems were largely superseded by viewdata services operated by public network service providers — Mediat from British Telecom, and Unidex from IBM. These services connected to over 20 insurance companies and provided quotations and a range of other services such as policy surrender valuations and electronic mail. They suffered from the disadvantage, however, that they merely connected the user to the insurance company's system; the user had to cope with different screen formats and log-on sequences for each company.

Mediat and Unidex have since been eclipsed by British Telecom Insurance Services, and InView from AT&T ISTEL. These services provide a common interface to different insurance companies' systems, and are therefore much easier to use. In certain cases, it is now even possible to initiate the insurance policy electronically: Brokernet, an EDI service provided by INS, handles the submission of proposals and other messages concerned with policy administration.

Off-line quotation systems have also increased in popularity. The increasing power and falling costs of personal computers have enabled brokers to take on functions previously performed by mainframe computers at insurance company headquarters, thereby saving themselves the communications costs associated with online systems. All the information that the broker needs to generate quotations from a range of insurance companies is provided on disc, and the software supplier provides a new disc with updated quotation algorithms each month.

The way the insurance quotation systems market has developed is typical of electronic marketplaces. Single-company systems have made way for systems that enable offers from many companies to be compared. Successive generations of systems have been increasingly user-friendly, and have reduced costs or provided additional functions. The range of companies and products that can be compared has also increased progressively. All of this has served to increase competition within the market.

Figure 1.3 Electronic marketplaces promote perfect competition

A 'market' was described in a preliminary hearing of the Greek courts around 600 BC as 'a place set apart for men to deceive and get the better of one another'. Today, Webster's dictionary defines it as 'the meeting together of people for the purpose of trade'.

Economists draw the distinction between 'perfect' and 'imperfect' markets. A perfect market exists where there are so many buyers and sellers that none can individually affect the price, and where there are no barriers to entering or leaving the market. A further requirement is that all information concerning the market conditions is available to all players. In a perfect market, output will be maximised, and prices minimised. Perfect markets allow companies to make the level of profit needed to stay in business, but no more.

In an imperfect market, and this applies to the majority of today's market sectors, these conditions do not apply. There may be regulatory barriers to participating in the market. Individual buyers or sellers may be large enough to exercise some sort of control over prices. The most common problem, however, is simply that the cost to the buyer of comparing all offerings, or the cost to the seller of promoting his wares to every possible buyer, are too high.

Within a local context, medieval village marketplaces were near-perfect: all buyers and sellers met at the same time and place, and information flowed freely. Today, such markets operate only within specialised fields such as securities, futures, and agricultural auctions. However, the application of information technology to both marketing and purchasing will help to move a wide range of industry sectors a little closer to the concept of the medieval village marketplace, by allowing large numbers of buyers and sellers to meet electronically. We call this concept 'electronic marketplaces'.

In Chapters 2 and 3, we examine the ways in which information technology will transform the marketing and purchasing processes, respectively. 'Electronic marketing' will essentially strengthen the hand of suppliers, while 'electronic purchasing' will strengthen the hand of customers.

Eventually, electronic marketing and electronic purchasing will start to overlap. This is one route

Figure 1.4 Research team and scope of the research

This report was researched and written by Richard Pawson and Karol Szlichcinski, both consultants with Butler Cox, based in London, who share considerable experience in new technologies, telecommunications and related services, marketing, and business development.

Original research for the report was conducted in Australia, France, Germany, Italy, the Netherlands, Singapore, Switzerland, the United Kingdom, and the United States. A large number of Foundation members were interviewed, together with independent experts, academics, and other organisations with relevant experience or plans. The research took place between February and October 1990. The two authors were assisted by Butler Cox's subsidiaries and agents outside the United Kingdom, and in particular, by Véronique Morlighem, Roberto Bellini, Lothar Schmidt, and John Cooper.

to the development of 'electronic markets', which bring together multiple buyers and multiple sellers, and in some cases, facilitate the matching of bids to offers. In Chapter 4, we examine this and other ways in which electronic markets can emerge.

In Chapter 5, we look at how the dynamics of markets change once they start to function electronically, and the implications of this. We examine the case for regulation in electronic markets and what this means for organisations that are about to initiate them.

Foundation members should assess the relevance to their own organisation of each of the developments discussed in Chapters 2 to 5, and make plans accordingly. We also believe that senior managers need to take a more strategic look at their relationships with their own markets, in the light of these developments. We expand this theme in Chapter 6, looking at possible courses of action for organisations faced with increasing competition through electronic marketplaces. We recommend that organisations review the basis on which they compete, the nature of their individual trading relationships, and the set of functions that they perform internally.

In Chapter 7, we explore the implications for the systems department. We explain why the systems department needs to form a strategic partnership with either the marketing department or the purchasing department, and what such a strategic partnership means in practice. We explain why the systems department needs to take a different approach to developing systems for marketing, in particular, from the approach that it takes to developing systems for its traditional customers, and we look at the implications of electronic marketplaces for systems infrastructure, quality, and standards.

We believe that electronic marketplaces represent one of the most exciting developments in the history of information technology. Organisations that ignore their potential will find themselves fighting increasing competition. For those that embrace the possibilities and manage the implementation properly, however, electronic marketplaces offer the potential for massive growth.

Chapter 2

Electronic marketing

For many organisations, the marketing department represents the last bastion to fall to the advance of information technology. One of the reasons for this is that many marketing managers regard their function as primarily a creative one that cannot be decomposed into the sorts of tasks at which computers excel. Assessing whether expenditure on marketing provides value for money is even more difficult than trying to justify investments in information technology and applications. There is an old saying in the advertising industry: ''Half the money spent on advertising is wasted; the problem is knowing which half''.

We believe that over the next five years, information technology will revolutionise the marketing process. The impact on the operation and profitability of many businesses will be substantial. So will the impact on the marketing department. Information technology will not replace the need for creative thinking, nor will it be more effective than a marketing manager with genuine insight, but by making marketing more precise, and its effects more quantifiable, it will eliminate some of the obvious wastes of money. It will put an end to the days when, as one advertising executive put it: ''Targeting just meant avoiding the sorts of blunders that even the client could spot''.

To understand the potential for information technology within marketing, it is necessary to understand the nature of marketing. Marketing is, or should be, fundamentally concerned with matching the organisation's offer to the demands of the marketplace. The match is made by controlling the nature of the products or services, the prices, the packaging, and the delivery mechanisms, and by communication with the marketplace, to help to shape customers' expectations and priorities. Matching is a task at which computers certainly excel, provided that the right information is available to them. In this chapter, we identify the four principal ways in which information technology has the potential to revolutionise marketing.

Electronic channels can strengthen existing customer relationships

By facilitating the flow of information between supplier and customer, electronic channels can be used to strengthen existing customer relationships, especially from the supplier's viewpoint. Of course, the telephone is an electronic channel, and many companies have put this to good use for sales and marketing — in particular, where they have streamlined their telephone-answering capabilities. Oral communication has its limitations, however. It generally requires both parties to be available for communication at the same time, it is unsuitable for conveying complex information, and it often requires that the information be converted from or to another format (such as paper) at both ends.

Electronic data communication has the potential to overcome these restrictions. These electronic channels can be of several kinds, ranging from online terminals, to electronic mail or facsimile, to touch-tone telephones. Many suppliers have already exploited this potential, but a larger number have not. The improved information flow encouraged by electronic channels can be turned to the supplier's advantage in the following ways.

Electronic channels can make it easier to place an order, thus enabling suppliers to acquire a greater proportion of their customers' business. By the early 1980s, most UK package-holiday operators provided their agents with telephone-booking facilities, and some offered out-of-area

lines to reduce the cost. When Thomson launched its videotex-based TOP booking system, other operators dismissed it as a nine-day wonder, but as Thomson's share of the package-holiday business grew from 15 per cent to over 20 per cent, competitors were forced to introduce similar systems.

Response times can be reduced, giving the supplier a competitive advantage. In Singapore, Shell has very recently initiated a simple electronic channel for sales of liquefied petroleum gas, the primary fuel for domestic cooking. Consumers now call one central number, and in response to a synthesised voice message, they key in their account code and a single digit corresponding to the size of cylinder required (all Singapore telephones are touch-tone). The sales computer looks up the customer's address and sends an alphanumeric paging message to the delivery truck nearest the address. Shell can undertake to replace an empty cylinder within 30 minutes of the call — around three hours ahead of its competition.

Limited offers can be promoted quickly and inexpensively. Through the use of electronic channels to its principal customers, a steel maker was able to create a profitable market for its over-run steel, as described in Figure 2.1.

Figure 2.1 Electronic sales channels have enabled a steel manufacturer to generate additional revenue

When a batch of steel is made for a customer, more steel has to be poured than the customer has ordered to allow for losses in the subsequent stages of production. For example, 250 tons of steel might be poured for a 200-ton order. In practice, the losses vary, so that the manufacturer is sometimes left with more finished steel than has been ordered.

One steel manufacturer traditionally offered such excess first to the customer for the main order, and then to other customers known to take the kind of steel in question. If the steel was not sold, it had to be downgraded after a time and sold more cheaply as non-prime steel.

In the early 1980s, the company started supplying its major customers with terminals, through which they can access a database of steel available from stock. Since the system was introduced, tens of thousands of tons of steel have been sold through it. When the system started, it was provided only to the company's own sales offices. Subsequently, customers were provided with computer terminals to access the system. Now, over 100 major customers use the system, accessing it from IBM PS/2 personal computers, for which they pay a subscription.

The limited shelf-life of the product meant that conventional sales channels were inappropriate.

Complex product information can be provided in an interactive form. Multimedia technology (advanced computer workstations that can display high-resolution images, full-motion video, text, and graphics) offers the potential for high-quality interactive sales brochures. Customers can explore the information at their own pace and direction, and the computer system can keep track of the pieces of information that most interest customers. When General Motors tested the use of multimedia interactive brochures for the launch of a new Buick range, it reported not only that the sales-conversion rate was significantly higher, but that the average value of each sale was also higher because the system encouraged users to explore the optional extras.

Specific products can be located rapidly, thus improving the chances of being able to match the customer's requirements quickly. British Leyland (the forerunner of the Rover Group) launched its car locator system 10 years ago. Prior to that, a dealer looking for a particular specification and colour of car ex-stock could afford to call only a handful of local dealers. With the electronic system, he had instant access to every British-Leyland-owned car in the national dealer network. The system, since enhanced, is still operated by AT&T ISTEL on behalf of the Rover Group.

Electronic channels can widen a supplier's market, in terms either of the time the market is open for business, or of its geographic scope. A Dutch supermarket chain has launched a trial electronic home-shopping system, described in Figure 2.2. The principal benefit to both the supermarket and its customers is that it overcomes the government restriction on shopping hours.

In the examples listed so far, the marketing and/or ordering processes are quite separate from the delivery of the product. In sectors where the product itself has the potential to be delivered electronically, such as information services and certain financial services, there are even more benefits, since the electronic channel can complete the entire cycle. The insurance industry is an obvious example. A less obvious possibility is the use of electronic channels by

certain government and public institutions to generate new sources of revenue from their information bases. Figure 2.3, overleaf, describes how the Società Nazionale di Informatica delle Camere di Commercio Italiane, the legal repository for all Italian company records and statutory accounts, has turned its database of corporate records into a profitable revenue stream.

Electronic channels, however, are by no means a licence to print money. Without careful management, electronic channels can, at best, end up consuming more funds than they generate. At worst, they can seriously backfire on the suppliers. Would-be introducers of electronic channels should bear three things in mind:

— *Electronic channels have a tendency to evolve into electronic markets.* What starts out as a cosy link between a single supplier and his customers is transformed by market or regulatory pressure into a system that allows those customers to order from several competing suppliers. That is not, in itself, bad news for a supplier — it can create new opportunities — but it could come as a nasty upset to a long-term business plan if the possibility were unforeseen. We explore this concept in Chapter 4.

— *Attempts to bypass intermediaries can backfire.* Some suppliers are tempted by the idea that electronic channels can be used to bypass intermediaries and communicate directly with the marketplace. There are good examples of this strategy working, but there are other cases where the intermediaries have fought back and even strengthened their role. In Chapter 6, we look at the impact of electronic markets on intermediaries.

— *Electronic channels require just as much development as any other sales channel.* They need promotion, management, and careful monitoring, and in addition, the technical infrastructure may need to be developed. Customers probably need both training and encouragement to start using the system, and many organisations forget this in their budgeting. Worse still, there is an extraordinarily prevalent but naive attitude that electronic channels can generate more profit for the suppliers, while paying for themselves through user charges. This confusion of commercial goals is one of the main causes of the failure of many of the electronic home-shopping services to date.

Figure 2.2 A Dutch supermarket chain has implemented a successful home-shopping trial

Albert Heijn is a Dutch supermarket chain (part of the Ahold group) with 550 stores in the Netherlands. The company has a reputation for innovation, especially in the use of information technology, and this is seen as one of the factors in its growth in market share from 12 per cent to 27 per cent over the last decade.

Several factors distinguish the Dutch retail food market from those of other countries. The geographic concentration of the Netherlands means that, overall, the population is served by fewer stores per capita than any other West European nation. Most people walk or cycle to the nearest store, and do so on average three times per week. However, supermarket hours are restricted by law to 52 per week, with only one evening's shopping. Electronic home shopping offers out-of-hours access, which appeals particularly to working couples.

Albert Heijn's home-shopping system is called James (after the archetypal English butler). The company bought the concept from a competitor and initially operated it in Haarlem, as a separate chain with its own limited product line. Two years ago, it decided to add technology and integrate James with the Albert Heijn chain. Early in 1990, it issued 1,000 free videotex terminals to carefully selected homes in Amsterdam.

Customers are able to order 10,000 food lines, equivalent to the range available in a typical large supermarket. They pay the same prices, plus a delivery fee of 5 to 10 guilders ($3 to $6) depending on the order. Delivery is within 24 hours and within two hours of the time specified by the customer. Albert Heijn subcontracted the management of the videotex system, but performs all other functions, including delivery, itself. A major part of the cost is order assembly, which defies automation, although the company has sponsored a research project to investigate the potential for advanced robotics.

The experiment is considered to be a big success, although it is far too small to be profitable. The average value of a customer order is 45 guilders compared with 29 guilders in the stores. Albert Heijn cannot yet ascertain if the demand is new, or substituting for visits to the stores. There is no firm commitment to expand the scheme yet.

Information technology can help suppliers to reach the right customers for their products

"Build a better mousetrap," claimed Ralph Waldo Emerson, "and the world will beat a path to your door". Most marketing managers, and a good many bankrupt mousetrap inventors,

Figure 2.3 In Italy, an electronic sales channel is providing a new source of income for public institutions

Governments and public institutions collect and analyse vast quantities of data for their own consumption. Attempts to sell such data in the form of large reports have been largely unsuccessful both because the data is usually out of date and because it is seldom in the form needed by potential customers. One Italian institution has established successful electronic sales channels for its data.

The Società Nazionale di Informatica delle Camere di Commercio Italiane is the legal repository for all Italian company records and statutory accounts. Ten years ago, the 100 regional Camere di Commercio started to computerise their records and jointly sponsored a new organisation, called Cerved. The database now holds records on the 350,000 to 400,000 companies with a capitalisation of more than 20 million lire, but not the 4 million or so smaller companies.

Cerved now sells the information to third parties, for two principal applications. The first is credit referencing, since any bounced cheque must be reported to the Camere di Commercio by law. The second is market information. Clients can request lists of companies operating within a particular market sector, geographical area, or size range.

In addition to name lists, Cerved produces accurate market statistics for a variety of industry sectors.

Cerved now has a turnover of 100 billion lire and 650 employees. Ninety-five of the 100 regional Camere di Commercio are connected to the system (an IBM 3090 with six network nodes) for both data input and retrieval. There are some 800 clients, with a total of 5,000 registered terminals. Forty per cent of the clients are financial, and 60 per cent are industrial or professional, the latter including the notaries, who must certify all share transactions. More than 300,000 messages are transmitted every day between the clients and the Camere di Commercio.

The next stage is to start selling the information through Videotel, the videotex service operated by SIP (the Italian national public telephone operator). There are 150,000 Videotel terminals in Italy, which represents a sizable market for the information. In theory, Cerved's information could be combined with that of the electronic yellow pages service already operating on Videotel to generate a product- and service-locator system that could also provide information on a supplier's financial situation.

would dispute this. If you want to sell your mousetrap, you have to beat a path to the customer's door, and unless you have an unlimited budget for shoes, it pays to know which houses are most likely to suffer from mice infestation.

Information technology can help in this search. In countries where the new technique of 'precision marketing' is well advanced, it is already possible to ascertain from someone's postcode his economic and social groupings, his likely ownership of cars and microwave ovens, and his propensity to go to the cinema or to drink wine with his meals.

Acquiring this knowledge, and applying it to finding the right customers for a supplier's products, is already changing the face of marketing. In the future, this knowledge will be acquired with increasing precision.

Precision marketing requires detailed knowledge of existing customers

Building a customer database is both difficult and costly. Many companies that sell direct to the public do not keep records of past customers, and many that do, know remarkably little about them. Even those with good customer records do not have them all available on their computer systems, nor accessible in a convenient form. Most banks, for example, have traditionally based their systems around accounts, rather than customers. This was not a limitation until deregulation allowed them (and effectively forced them) to compete with other financial institutions by selling mortgages, life assurance, and pension schemes.

For many organisations, what passes for a customer database is little more than a mailing list culled from a variety of sources, and a simple mailing list provides only a crude means for targeting promotions to the most appropriate customers. Such lists typically contain many duplications, and a great deal of effort has to be expended in updating and 'de-duplicating' the lists. La Redoute, a leading French mail order company, for example, has developed an expert system specifically for this task.

If companies wish to exploit developments in precision marketing to the full, and are genuinely committed to a customer-oriented approach, the only answer is to build a new database from the customer downwards. Burton Group Financial Services (now owned by G E Capital) was faced with the prospect of merging a range of existing customer records, and opted to build a new customer database from scratch. Its experience is described in Figure 2.4. The

Figure 2.4 A major storecard operator uses its cardholder database for precision marketing

G E Capital — Retailer Financial Services operates more than 35 million storecards worldwide. In July 1990, the company acquired Burton Group Financial Services (BGFS), the storecard operation of the Burton Group, a major British retail group. The United Kingdom-based part of G E Capital continues to operate storecards for the Burton Group under contract, as well as for several other retailers. Prior to becoming part of G E Capital, BGFS developed a sophisticated customer database, which is now actively exploited by G E Capital.

The database is used for store promotions, such as special offers and sale previews, aimed exclusively at cardholders. The level of detail held on the customer's record makes it possible to target these promotions very specifically, with store location and type of goods recorded for each transaction. Marketing managers at the Burton Group could, for example, offer a special promotion on suits to 'all male cardholders aged 25 to 40 who have previously made a major purchase from a Burton store, but who have not made such a purchase for at least 12 months'.

Many of the cards permit cash borrowing, and this may be a good indication that a particular customer may be receptive to a promotion for a personal loan or another financial service. G E Capital puts considerable effort into identifying such customers. So-called consensus groupings have in the past proved very effective for targeting financial promotions. The illustration shows two promotions for an identical personal loan: the one on the right (designed to look like a serious contract) is targeted at the 'connoisseur' consensus grouping, and the one on the left at the 'carefree' group. However, the appropriate grouping can be determined only by asking the customer a series of questions about attitudes and aspirations, and G E Capital cannot legally store these responses on its database. An attempt was made to predict the consensus grouping from other, legally stored, information, but results were not sufficiently accurate to be usable.

All new card applications are now 'grouped' using the Acorn and Mosaic postcode-based systems, which help in targeting promotions to particular income or 'lifestyle' groups. However, the company has found that analysis of its own data on past patterns of card usage produces better results for predicting responses to a promotion. Direct-mail promotions are more expensive than might be imagined, but by using sophisticated statistical techniques (such as multiple linear regression) to develop targeting response models, the company found that it was able to achieve similar volumes of response, typically for half the cost.

The final use of the customer database is for cross-selling opportunities between the different retail chains in the Burton Group, based on analysis of purchasing data. For example, if a Top Shop (young female fashion) account starts to tail off and the cardholder is past her mid-20s, she may be offered a card for one of the other chains aimed at a more mature customer — Dorothy Perkins or Principles, for example.

In building the integrated card-management system relatively recently, BGFS had the undoubted advantage of starting with a clean sheet of paper. From a technical viewpoint, it saw a clear need to use a relational database. The Model 204 relational database package was selected, to run on IBM hardware. The company attributes much of its current capability to that decision.

Marketing managers within G E Capital have direct access to the database. They create their own 'segments' of the database by searching against specific criteria, often on an iterative basis. When they are satisfied with the segments created, they can pass these over to the direct mail department, without the need to involve the systems department.

The software menus on each user's terminal are dynamically constructed to offer only the functions that a particular user requires. The system is very fast in operation, reflecting the powerful indexing capabilities of Model 204. Most marketing enquiries can be answered from the indexes, without searching the database itself.

investment is now paying off, by making high-precision marketing possible.

Not all organisations view intimate customer knowledge as a good thing, however. One major supermarket chain that we spoke to claimed that customers valued the anonymity of supermarkets, and stated, "We have no intention of 'crossing the Rubicon' — treating customers as individuals — without some extremely careful research into its consequences." Another retailing group suggested that it carefully nurtured a service image, and that such brash marketing techniques could potentially damage that image. These views may well be valid, but we believe that they overestimate public objections. Many organisations that use their databases for direct mail offer their customers the option not to receive promotions. Although people like to complain about junk mail, they seldom take the no-promotion option.

Precision marketing requires a means of communicating with specific groups of unknown customers

The most powerful new tools for identifying potential customers (consumers, rather than businesses) are the geodemographic databases — comprehensive mailing lists that categorise neighbourhoods according to average age, income, or lifestyle information. The United Kingdom probably leads the field in this respect, on account of its relatively sophisticated postcode system, and its regulatory homogeneity, although such databases are also well developed in the United States and the Netherlands. Figure 2.5 describes how the two market leaders in UK geodemographic databases are constantly striving to find new ways of inferring the lifestyles of householders.

Once potential customers have been identified, the options for communicating with them are widening from the traditional channels of direct mail and telephone marketing. Conventional media, such as print and television, can increasingly be used to target specific sections of the public. Desktop publishing systems, for example, have changed the economics of small-circulation magazines, and satellite technology is already heralding the age of 100-channel television reception. Although this fragmentation is hurting some of the long-standing players, it offers increasing precision to advertisers.

Some publishers are taking this further with the concept of customised publications, and its equivalent in television — 'narrowcasting'. A major farming magazine in the United States now customises some of its sections according to the type and size of the reader's farm. In 1990, both *Time* and *Newsweek* announced their intention to facilitate personalised advertising for the subscription copies of their magazines — a concept that would have been unthinkable without sophisticated information technology. At the crudest level, these advertisements could address the customer by name, or list the nearest distributors to the reader's home. At the more sophisticated level, the advertisements could be tailored to the assumed aspirations of individual readers.

Facsimile is another channel that lends itself to automated and personalised communications, although there is increasing concern about 'junk fax', and some countries are starting to legislate against it.

In the future, it is not inconceivable that new generations of cable television technology will enable two neighbours to watch the same film on their televisions, yet see different advertisements. Brand Y of margarine will target its advertisements at those currently believed to be buying Brand X, and will even be able to monitor the effectiveness of its campaign using the point-of-sale systems at the local supermarket.

Information technology can help suppliers to generate the right products for their customers

While information technology can help suppliers to find the right customers for their products, this must be seen as a stepping stone, not the final objective. The organisations that emerge from the 1990s in the strongest position will be those that successfully transform their approach into generating the right products for their potential customers. Selling one product at one price to one million customers is the metaphor of the past. Selling one million different products at one million different prices to those one million different customers is the metaphor for

Figure 2.5 Precision marketing has created new business opportunities for geodemographic databases

Most UK companies using precision marketing subscribe to the services of either CACI or CCN Marketing (in many cases both) — the leaders in geodemographic databases. Both make extensive use of the postcode system — in the United Kingdom, one postcode covers an average of just 20 houses. User organisations can access the databases in a variety of ways — from a one-off classification of their customer databases, to a cut-down version of the database running on their own PCs, to a full-scale licence to use the database on their own mainframes.

CACI's Acorn (A Classification Of Residential Neighbourhoods) was built around the 1981 national census data. (The 1991 census data will not become available until 1993, and CACI believes that the following one could well be Europe-wide.) Acorn classifies all postcodes into one of 39 types of accommodation.

CCN is owned by Great Universal Stores, and was set up to provide credit references for its catalogue selling. It is now the largest consumer credit reference agency, and is moving into providing business information. CCN Marketing was formed when the originator of Acorn moved from CACI to CCN to set up a competitor that capitalised on CCN's knowledge of credit status and credit volume by geographical area. CCN Marketing also teamed up with SPA Marketing Systems Ltd, which had detailed maps of retail catchment areas. The result is Mosaic, a database that classifies all postcodes into one of 58 types of accommodation, such as purpose-built private flats, or high-status retirement areas.

For both CACI and CCN Marketing, the new emphasis for the 1990s is classification by lifestyle rather than by accommodation type. CACI's Acorn Lifestyles database and CCN's Persona both identify around 20 basic lifestyle types, although the two sets are not equivalent. To make them easier to remember, Persona's are described by 20 cliché phrases such as 'golf clubs and Volvos' for lifestyle 01.

New ways are constantly being sought both to refine the information in the databases, and to find new ways of exploiting it. CACI's Monica attempts to predict the age of householders from their Christian names (which it acquired by purchasing local electoral registers), on the basis that names come and go in fashion. The more names in a household, the better the accuracy: it transpires that Joan and Arthur really are a retired couple, while Darren and Tracy are in their early twenties.

Retail store location and floorspace planning (how much space to allocate to clothes versus furniture) are examples of value-added applications. CCN's Checkout derives its input from the National Shoppers Survey, which receives some 2.5 million responses annually. For any postcode, it can now predict the first- and second-choice shopping locations, weekly expenditure on groceries, and the stated sensitivity to different factors such as price, quality, and choice. This information, combined with a digitised road map that specifies driving times, can be used to optimise the location of new stores. Furthermore, using statistical techniques to extract the significant factors, Checkout can be used to generate realistic monthly targets for individual existing stores.

the future. Information technology has the potential to make this concept a reality.

Customising the product

Customised products and services are not at all new: double-glazed replacement windows and bespoke suits are made to order, as are the most exclusive cars. What is new is the combination of customised specification with the benefits of mass production, where the economies of scale permit massive research and development costs and optimised manufacturing techniques.

In Japan, Toyota now claims that it can deliver a car to a customer's address within eight working days of the order being placed — built to specification, with over 1,500 option configurations. The manufacturing logistics were sorted out years ago, but until recently, the ordering and delivery processes added weeks to the total time. The order/manufacturing/delivery chain is only as strong as its weakest link, however, and managing the flow of information from order through to delivery becomes as important as optimising individual stages along the way. Toyota's new objective is four days — a customer who telephones his order on Monday should be able to take delivery on Friday.

The next sector to adopt this combination of mass production and customised specification will almost certainly be white goods — washing machines, ovens, and refrigerators. Building to order allows manufacturers to extend their range from 10 models to 100 or 1,000, without tying up their resources in stockholdings — many retailers can no longer afford to stock every possible model.

In general, the higher the 'information content' of a product, the greater the potential for customisation through information technology. A major American academic book publisher is considering moving to fully customised coursebooks: course lecturers will be mailed with the contents pages of each of the titles that the company publishes on, say, accountancy.

Lecturers can select relevant chapters from any of the books, to suit their own course, and the publisher will then produce a limited print run of the customised compendium especially for that establishment.

The customising of products requires substantial investment, and it is not guaranteed to work. Figure 2.6 tells the story of a financial services company that customised its products from the outset, but that failed to achieve the volumes needed. Part of the problem was the difficulty of communicating the real differences between the products.

Customising the packaging

Customising the product to suit the demands of individuals also means customising the price and the packaging. Packaging is easier. A major manufacturer of light bulbs can now distribute bulbs to any point in Europe in 48 hours. The product is standard and requires no customisation, but the manufacturer has to be highly flexible in meeting the demands of its customers — the retailers — for packaging: bubble packs, four for the price of three, special promotions, and so on.

Customising the price

Customised pricing means varying the price according to demand, rather than to the cost to the supplier. However, the public can react very negatively to the concept that the price for a fixed product or service varies in time, or region, or even from customer to customer. A local government authority came up with the brilliant idea of varying the entry price to its open-air swimming pool according to the temperature, but found itself facing an uproar in the town, and the scorn of the national press. The fact is, however, that in many sectors, variable pricing is taken for granted: a telephone call costs more in the morning than in the evening, train tickets may change price in off-peak hours, and in the economy section of a 747, it is highly unlikely that two people sitting next to each other paid the same price for their seats.

Figure 2.6 Despite sophisticated telemarketing and customised product design, one financial services company failed to achieve its business plan

Even companies that embrace the concept of the electronic marketplace wholeheartedly are not guaranteed success. During the course of our research in 1990, one of the companies that we had been observing ceased trading. The Savings Corporation was established in the United Kingdom to sell savings products to consumers, using both direct marketing and agencies. From the outset, the company made extensive use of information technology, both for product design and for marketing.

The products were a series of savings plans that had different degrees of risk, expected return, payback periods, and tax implications, each with a strong brand image, and designed to appeal to different sectors of the population. In fact, the products represented different permutations and combinations of a base set of unit trust funds and financial instruments managed by established third parties, but unseen to the customers. The Savings Corporation's sophisticated computer systems would simply translate a payment or withdrawal on a customer's account into its component parts on the managed funds. If customers wanted to transfer their funds from one of the branded savings products to another, as their aspirations changed, the process was straightforward. Although only six different branded products were promoted, The Savings Corporation's systems would ultimately have allowed products to be designed to each individual's requirements.

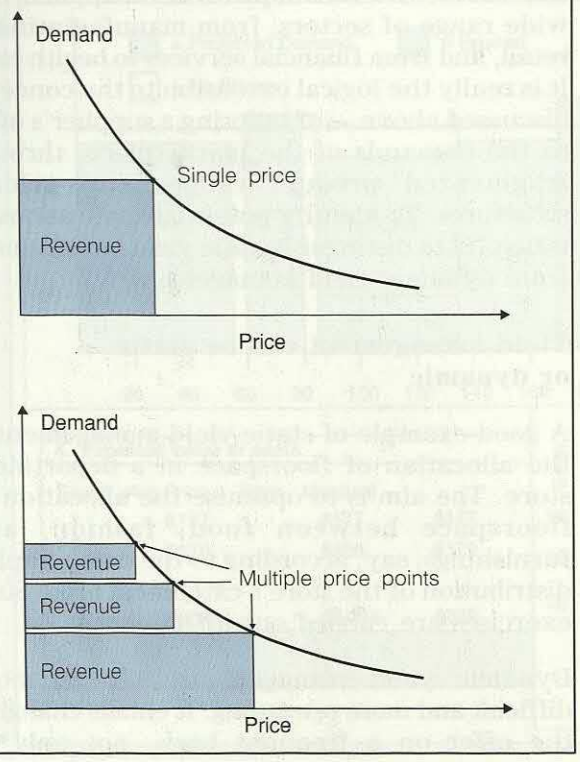
The marketing side was equally sophisticated, making extensive use of campaign-management software. It had a fully integrated telemarketing system that displayed personal and product details as a sales call was being made. The system incorporated an expert advisor, which through a series of prompted questions, attempted to infer the so-called 'consensus grouping' of the prospect — connoisseur, pragmatist, traditionalist, carefree, and so on. From this analysis, the advisor would prompt the telemarketing operator with the most suitable of the branded savings products to promote to the respondent, based on past success rates.

So where did the operation go wrong? It would be a mistake to look for a simplistic answer. Success was heavily dependent both upon continued support from the US parent (which was not forthcoming), and upon the prevailing economic climate in the United Kingdom. One specific problem, acknowledged by the marketing department, was the difficulty of communicating the differences between the branded products. The law forbids projections of expected earnings on a speculative fund, and risk cannot be sold as a benefit. Thus, although the products represented a real spectrum from low-risk/low-return to high-risk/high-return, the brochures and sales pitch had to be worded in 'homogenised' only-good-news language. The moral, if there is one, is that customised products, pricing, or delivery mechanisms are only as good as their perceived benefits to the customer.

Some instances of variable pricing are more subtle: a 1.3 litre and 1.6 litre version of a family saloon cost virtually the same to manufacture. The wide range of engines and interior specifications is largely a device to enable the manufacturer to sell the customer a car at the price he can afford. The early days of the computer industry contained some extreme examples: one Foundation member recalled paying a substantial sum for an upgrade to his mainframe. When the engineer arrived, far from adding any new circuit boards, he merely removed a link, thus increasing the speed of the processor.

Customised pricing can be introduced successfully, but it does require an understanding of the subtleties of price-demand curves. As Figure 2.7 illustrates, the more points that a supplier can place on the price-demand curve, the greater the potential revenue. It is essential, however, to ensure that those who will pay the higher price do not purchase at a lower price. This can be achieved either by dealing with customers individually (by direct mail or through telemarketing, for example), or by packaging the lower-priced versions of the product so that they are unattractive to those who will pay a higher price.

Figure 2.7 By putting more price points on the demand curve, suppliers can increase their revenue



One of the more general impacts of the application of information technology to marketing is that it will start to bring together the disciplines of economics and business management. In the past, when economists have talked of supply and demand curves, they have had to deal in abstractions. Using information technology to control micro fluctuations in pricing, it becomes practicable to measure factors like demand elasticity directly. A new possibility is 'electronic couponing' — in the future, monthly storecard statements may well contain messages such as: 'Try our new tandoori chicken during July using your storecard, and we'll deduct 50 cents from the displayed price'. Your neighbour may receive the same message, but with a 25-cent or a 75-cent reduction — enabling the store to test the exact demand elasticity for the new product.

Supermarkets, some of which already operate regional pricing policies, may soon be varying their prices during the course of the day. Consumers are demanding higher levels of service, but within Europe, labour availability is falling owing to changing population demographics. Since staffing levels are at least partially determined by peak loading rates, supermarkets will be seeking to even out the peaks in demand. One method is to encourage more people to shop in the off-peak hours such as mid-afternoon, by reducing the price on a wide range of goods.

The enabling technology for this is called electronic shelf-edge pricing (or electronic shelf tagging). One of the dozen or so commercial systems now being tested by major supermarkets in the United States and Europe is pictured in Figure 2.8, overleaf. It replaces the conventional plastic shelf-edge price labels with liquid crystal displays. The displays are updated remotely, via radio signals, infra-red, a cable running along the shelf, or in one case, by signals encoded into the flickering of fluorescent lighting. The motivation behind electronic shelf tagging is more mundane than customised pricing; it is to ensure that the price on the shelf is consistent with the price on the checkout systems. Discrepancies have resulted both in

Figure 2.8 **Electronic shelf tagging will ultimately make it possible for supermarket prices to be varied according to the time of day**

(Source: Retail Electronics Limited)

bad publicity and lawsuits. Once a supermarket has the possibility to make instantaneous price changes with minimal effort, however, more dynamic pricing will be the consequence.

Yield management will become both possible and necessary for many suppliers

Yield management is a technique for maximising revenue from a fixed resource, by optimising the mix of high-price, low-demand items with low-price, high-demand items. The technique was pioneered by the airlines. Within the economy section of a 747, a single airline can typically offer 20 or 30 different fare classes: full economy, apex, super apex, round-the-world, and a variety of group rates. The physical product is the same, but the fare classes are distinguished by largely artificial means, such as constraints on advance booking and changes to travel arrangements. The task of the yield managers is to allocate the number of seats to each fare class, often changing the make-up on a day-to-day basis. The decisions are critical – they entail evaluating the risk of turning down bookings today in the expectation of future bookings at a higher rate, for example. Yield-management departments employ powerful statistical tools to extract patterns from previous booking records, and hence, project demand for future flights. Figure 2.9 describes an advanced system, called Airline Marketing Tactician, which uses the new technology of neural networks to improve the accuracy of its forecasts.

Interest in yield management is widening – it is already the subject of international conferences. Other sectors of the transport and travel industries are the first to bite. In both France and the Netherlands, the national railways are seeking new ways to increase the sophistication of their services to compete with the airlines, and yield management is one concept under consideration. Hotel room sales and car rentals are other promising areas.

Yield management has been largely associated with perishable goods – an airline seat has zero value after the plane has taken off – but the application is far wider. We believe that during the 1990s, the technique will be applied in a wide range of sectors, from manufacturing to retail, and from financial services to health care. It is really the logical extension to the concepts discussed above – of tailoring a supplier's offer to the demands of the marketplace, through fragmented product ranges and pricing structures. To identify potential applications, it is helpful to distinguish static yield management from dynamic yield management.

Yield management can be static or dynamic

A good example of static yield management is the allocation of floorspace in a department store. The aim is to optimise the allocation of floorspace between food, fashion, and furnishings, say, according to the demographic distribution of the store's catchment area. Such exercises are carried out infrequently.

Dynamic yield management is both more difficult and more rewarding. It entails changing the offer on a frequent basis, not only to

Figure 2.9 New technologies such as neural networks can increase the sophistication of yield management

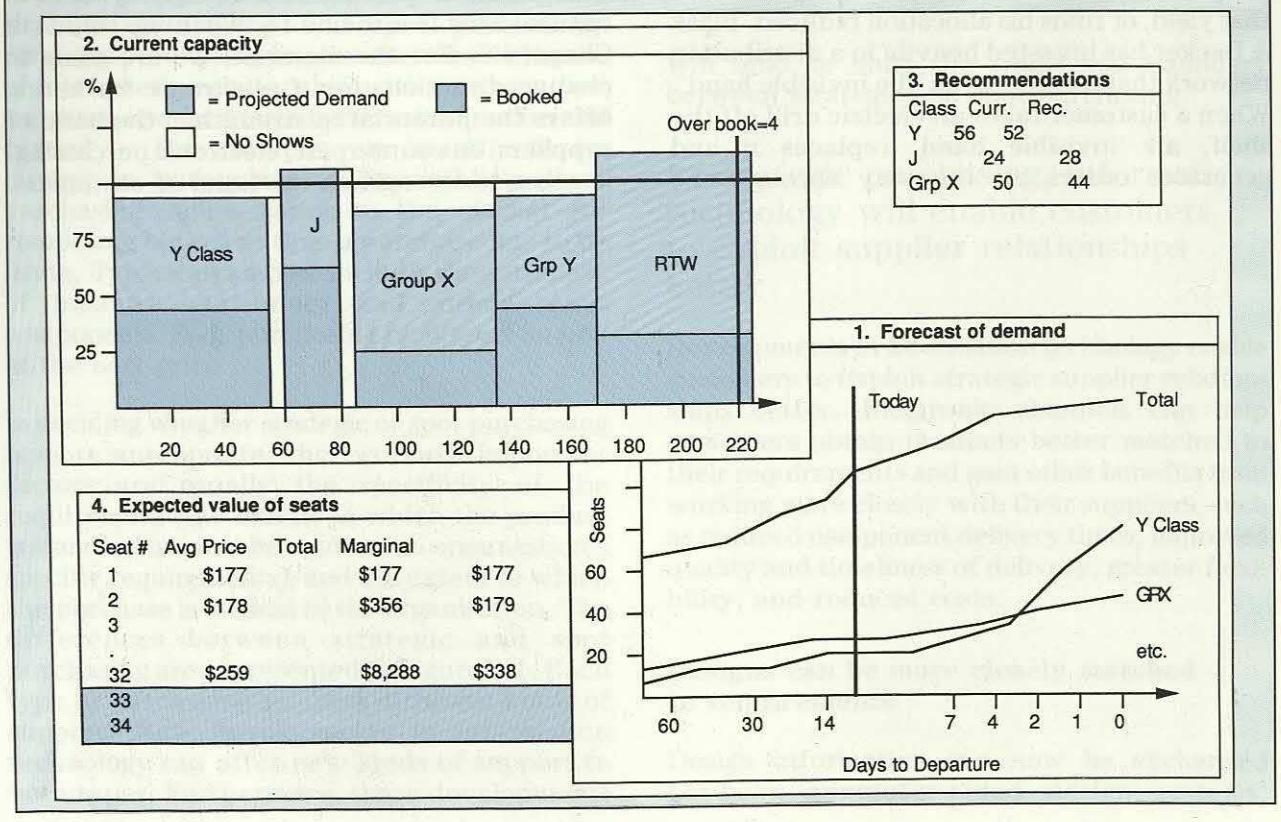
Airline Marketing Tactician (AMT) is a yield-management system for airlines, developed by a small US-based entrepreneurial company called BehavHeuristic. The package runs on a high-performance Apple Macintosh, and downloads the data that it needs from an airline's mainframe computer reservation system. AMT advises the airline's yield manager, on a daily basis if required, of the optimal allocation of different fare classes within each flight, in order to maximise the expected revenue.

AMT is more advanced than most yield-management systems. Simulated neural networks (discussed in detail in Report 73, *Emerging Technologies*) extract patterns from past records of customer booking patterns, taking into account the destination of the flight, the time of day, the week and year, and the number of competitors' flights on the same route. Neural networks are able to identify far more sophisticated patterns than conventional statistical techniques. The output from the network is fed into a linear programming module that calculates the optimal mix of fare classes on a day-by-day basis.

AMT is written in the object-oriented language, Smalltalk. Apart from being well suited to the internal operation of the package, this also facilitated the development of a sophisticated graphical user interface. In view of the vast amount of data presented by AMT, BehavHeuristic felt that a highly graphical display was essential.

A partial recreation of a typical AMT display is shown below (the company is very sensitive concerning actual reproduction of its displays). Window 1 displays the system's forecast for the take-up of each fare class (Y, GRX, and so on) between the current date and the date of the flight, based on past booking patterns. Window 2 shows the current bookings and estimated final bookings for each class, together with the predicted number of 'no-shows' on the day of departure. It also shows that, currently, four more seats have been allocated for sale than exist on the aeroplane. In fact, one of the functions of yield management is to optimise this level of overbooking to allow for no-shows on the day while minimising the risk of having to deny boarding (small comfort to anyone who has had the experience). Window 3 uses this information, plus a linear programming algorithm, to recommend today's changes to the allocation of fare classes. Window 4 is a very new concept — it displays the expected revenue for each of the remaining unbooked seats on the aeroplane. This information, unavailable to most airlines, could provide an accurate basis from which to make discretionary deals in the days up to take-off.

BehavHeuristic is not finding the sophisticated concept of AMT easy to sell, despite its claim that it can increase seat revenues by between 10 and 15 per cent. Canadian National was the first airline to use the package. Not surprisingly, other airlines are reluctant to pay the $250,000 to $750,000 licence fee to a small company with no guarantee of continuity. BehavHeuristic must be credited with confidence in its product, however. It says that it is prepared to waive most of the licence fee for a share in the airline's increased seat revenue.



respond to gradual changes in the marketplace, but also to small fluctuations in demand resulting from factors such as the weather, competitors' activities, or even from film and television programming (major drinks manufacturers now monitor television schedules very carefully).

Retailers probably stand to gain the most from dynamic yield management. In Japan, Seven Eleven operates some 4,000 retail outlets, the majority of them franchised, and many of them very small. A critical element of Seven Eleven's operation is a sophisticated electronic network — the tills are linked directly to the distribution warehouses, and each store receives three deliveries a day. As a consequence, Seven Eleven is now able to manage the stores' shelves on a dynamic basis: the same shelf might contain milk in the morning, TV dinners in the evening, and milk again the next morning, yielding far higher revenues than a fixed allocation.

In Europe, some major out-of-town stores are starting to encourage their suppliers to yield-manage their own stock: the store specifies to the supplier the yield that it expects from the shelf space allocated, and the supplier controls the products stocked on those shelves to achieve that yield, or finds his allocation reduced. Black & Decker has invested heavily in a distribution network that it refers to as 'the invisible hand'. When a customer takes an electric drill off the shelf, an 'invisible hand' replaces it and generates orders all the way through the distribution chain to the manufacturing plant. In the long run, such precise control would make dynamic management of the stock possible: if a sunny weekend is predicted, the home decorating and maintenance products would be taken off the shelves and be replaced by gardening implements.

Yield management is not universally applicable, however. While variable pricing seems to have presented little problem to the airlines, applying the same principle to package-holiday prices has proved trickier, perhaps because customers have a whole week to compare prices with each other. Another constraint is where the resource is used for secondary purposes, such as 'overfacing' in supermarkets — that is, giving a product additional space for promotional purposes. Supermarkets report that although their customers buy more of the supermarket's own brand, the concept of free choice is psychologically important. Devoting more than 40 per cent of the shelf space to own brands can actually reduce sales. Such constraints need to be planned into the system, and tested from time to time.

For companies to survive the 1990s, they need to make their offerings increasingly dynamic in nature. This is a theme to which we return in Chapter 6. For the moment, we are going to change direction, for if electronic marketing offers the potential to strengthen the hand of suppliers, its counterpart, electronic purchasing, is going to strengthen the hand of customers.

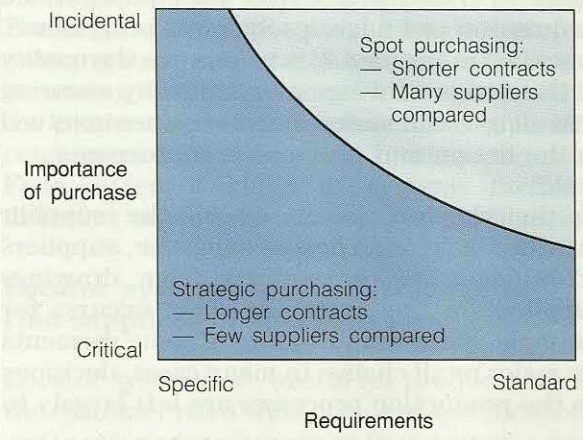
Chapter 3
Electronic purchasing

If electronic marketing can strengthen the hand of suppliers, the advent of electronic purchasing will strengthen the hand of customers. Electronic marketing is probably familiar to more companies than electronic purchasing, but the latter is every bit as real. Organisations need to understand the implications of electronic purchasing for two reasons — to make their own purchasing more effective, and to anticipate its use by their own customers.

The changing business environment is placing new pressures on the purchasing function. Product life cycles are being reduced. Greater emphasis is being placed on quality. There is pressure to reduce the levels of stocks held at each stage in the supply chain. One result has been the gradual polarisation of purchasing into strategic purchasing and spot purchasing. Strategic purchasing implies the establishment of a long-term relationship with one or a few suppliers, and facilitates better coordination and control — for example, car manufacturers buying in suspension subassemblies. Spot purchasing implies going to the market for competing bids each time a purchase has to be made. Typical examples include the purchase of business stationery and minor plant components. Spot purchasing facilitates buying at the best price.

In deciding whether strategic or spot purchasing is more appropriate, the two most important factors are usually the specificity of the requirement (the extent to which the product is standard or must be made to an organisation's specific requirements), and the extent to which the purchase is critical to the organisation. The differences between strategic and spot purchasing are represented in Figure 3.1. Each type of purchasing requires different kinds of support. New developments in information technology can offer new kinds of support to both types. Furthermore, these developments will tend to shift the traditional boundary between strategic and spot purchasing.

Figure 3.1 Purchasing can generally be classified as strategic or spot



In strategic purchasing, information technology will enable customers to exploit supplier relationships better

Developments in information technology enable customers to exploit strategic supplier relationships better. Electronic channels can help customers obtain products better matched to their requirements and gain other benefits from working more closely with their suppliers, such as reduced component delivery times, improved quality and timeliness of delivery, greater flexibility, and reduced costs.

Designs can be more closely matched to requirements

Design information can now be exchanged between computer-aided design systems,

enabling design data to be transferred between organisations (and within organisations, between design offices) much more quickly and cheaply. Ford of Europe estimates that, by 1991, it will be electronically exchanging some 14,000 drawings each day between its European design offices, and with its principal suppliers. As a consequence, suppliers of major components are now able to work much more closely with car manufacturers to tailor the design to the precise requirement. Product development times can also be substantially reduced.

One of the major objectives of the US Department of Defense's CALS (Computer-Aided Acquisition and Logistics Support) programme, described in Figure 3.2, is to improve the quality of the design of weapons systems by ensuring that all relevant areas of expertise are involved in the design and procurement processes.

In the simplest cases, where the supplier provides little or no design expertise, suppliers traditionally make products from drawings supplied by the customer. This occurs, for example, in the manufacture of some garments for major retail chains. In many cases, decisions on the production processes are left largely to the supplier. Customers can now communicate their requirements directly, in the form of data to drive numerically controlled machine tools. Although the main motivation may be increased efficiency, it results in the customer's exercising more control over the production process as well.

Information technology enables customers to get better service from their suppliers

The benefits of automating the exchange of orders, invoices, and other standard business messages between organisations and their suppliers are now well known. Electronic data interchange (EDI) enables customers to get a more rapid response to their orders by eliminating delays in the physical communication of the order and its entry into the supplier's system. It helps eliminate errors from the ordering process, and saves costs by eliminating duplicated activities — for example, data entry. (We described these benefits in detail in Report 59, *Electronic Data Interchange*.)

EDI and related technologies can also make more fundamental changes possible. By reducing the errors in the ordering process, and

Figure 3.2 The US Department of Defense has adopted a strategy to make procurement a totally electronic process

The US Department of Defense (DoD) has adopted a strategy for Computer-Aided Acquisition and Logistics Support (CALS). The strategy is designed to transform defence procurement from being an excessively paper-intensive process to a totally electronic operation. The DoD is driven by four priorities:

- The need to cut costs while maintaining military capability.
- The need to shorten development cycles for weapons systems.
- Pressures to take a wider range of factors into account in the specification of already complex weapons systems.
- The desire to involve more contractors in each project and to make projects less dependent on any one supplier.

CALS aims to remove the need to exchange paper documents and to replace them with electronic data transfer. (The 22 tons of paper needed for the maintenance and operation of a submarine would be replaced by an optical disc.) The objectives are to reduce the cost of weapons acquisition programmes by 50 per cent and to shorten their 10-year timescales.

An extension of CALS, CALS Concurrent Engineering, is intended to overcome the problems of current approaches to the design of weapons systems, which focus on prime function while neglecting such factors as reliability and maintainability. The classic — and true — example of the problem with the current design processes is the tank with an engine that lasts, on average, 18 hours. Production engineers, maintenance specialists, and others need to be involved in the design process, while the process is itself speeded up and the documentation reduced.

The DoD would like to be able to involve specialist organisations at each stage of the production cycle, if appropriate, rather than commit to a single contractor for design, manufacture, and maintenance. It also wants to reduce its continuing dependence on a single supplier over the lifetime of a weapons system, which can be 25 years.

To achieve these objectives, the DoD will have to have access to a much wider range of information than hitherto, systematically codified in standard forms that facilitate easy access and rapid transfer between organisations. It is adopting a range of open systems standards, and drawing up specifications of the way information should be structured for submission to the DoD. It will also require all design, development, production, and maintenance information to be held on shared databases.

by providing sufficiently rapid feedback for management to be able to identify deficiencies in ordering and dispatching procedures, EDI enables purchasing managers to achieve major improvements in the quality of supply. GPT, the British telecommunications equipment manufacturer, has instituted a programme of this kind. It is establishing an approved list of suppliers, who have preferential access to business from GPT. To be put on the list, and to stay on it, suppliers have to achieve 100 per cent accuracy and timeliness in meeting orders. EDI makes such goals feasible.

The adoption of just-in-time purchasing and delivery techniques can substantially reduce costs and improve flexibility. Just-in-time implies a reduction of stocks, and thence of the working capital tied up in them: materials are supplied as they are required. The materials concerned may be components in the case of a manufacturer, or finished goods in the case of a retailer. Just-in-time typically requires excellent communications between customer and supplier.

Closer interworking can change the nature of individual organisations

The development and exploitation of strategic partnerships has consequences for both customers and suppliers. Closer interworking dramatically increases the level and range of information that needs to be exchanged. Customers must make sales-planning and forecasting information available to their suppliers to ensure that they are better prepared to meet requirements as they develop. Some major retailers are even sharing data from their electronic point-of-sale systems with certain suppliers.

Suppliers need more sophisticated management information systems, such as material requirements planning and computer-integrated manufacturing, to cope with the greater responsiveness and flexibility demanded by their customers. They will also have to ensure that their own suppliers are equally responsive.

One corollary of closer working with a few strategic suppliers, and the move to more information-technology-intensive methods of trading, is that customers are rationalising their supplier lists and decreasing the numbers of suppliers with whom they do business. Suppliers unable to convert to EDI or to implement the systems needed to support just-in-time delivery will lose the business.

In spot purchasing, information technology can improve purchasing power

While spot purchasing holds the attraction of buying at the market's best price, its major disadvantage is the cost and effort of searching for potential suppliers and comparing their offerings, and the uncertainty that this brings. The key to better spot purchasing is therefore reducing the cost of search and comparison, and increasing its effectiveness. This is true whether the commodity being purchased is engineering components, insurance, or foreign currency. Four different kinds of systems facilitate different aspects of competitive purchasing.

Locator systems enable customers to find suppliers of specified products

Locator systems are useful for products where the customer has a wide choice of specifications, or for categories of products that contain a wide range of items. The customer needs to identify the supplier, or supply location, from which he can obtain the precise product he requires. Examples include systems that help airlines find sources of urgently required spare parts for aircraft, and that help architects and other building professionals find sources of materials to fit out building interiors.

Some locator services are aimed at the consumer rather than at business users. In the United States, the Comp-U-Card service will advise subscribers of the stores that can supply a specified household product, and their advertised prices. In several countries, potential house buyers can search databases for properties that match their requirements, specified in terms of size, location, and price range.

Quotation systems obtain comparative price quotations

Quotation systems are most useful where products are available from multiple suppliers,

and price is a major factor in the purchasing decision, but where the requirements can be specified in a relatively standardised format. Such systems are particularly well suited to financial products and services; their application in the retail insurance sector in the United Kingdom is described in Figure 3.3. Many of the most widely used financial information services are quotation services, such as those that quote foreign exchange rates, or prices for securities in which an institution makes a market.

With all quotation systems, as defined here, the transaction itself is completed using some other medium. Sometimes, this is because completion requires additional activities that cannot readily be handled online. Deals in the foreign exchange markets, for example, are often completed on the telephone: the rates quoted online are indicative only, and the actual rate for a particular transaction has to be negotiated. However, in many cases, the reason for the separation is largely historical, and screen-based ordering will be a natural development.

Tendering systems enable large organisations to publicise their requirements

Tendering systems are particularly well suited to public-sector organisations that need to employ formal competitive tendering procedures and that place a high volume of contracts. The European Commission operates a database of public-sector requests for tender, which can be accessed by potential suppliers throughout the community. Supplynet, a procurement network used by the government of Western Australia (see Figure 3.4), is not only reducing the cost of supplies to the government, but helping local industry as well. In the United States, an organisation called CBD Search Services takes the *Commerce Business Daily* (a newspaper of 64 tightly packed pages describing

Figure 3.3 A systems house provides software that enables insurance brokers to compare quotations from different insurance companies

In the United Kingdom, most insurance for private individuals is sold through insurance brokers — intermediaries who are either small independent operators, or companies that operate a chain of retail outlets. Policy Master is a company that specialises in providing systems for the insurance industry. It provides standalone quotation systems for brokers, and in addition, has recently developed two new products exploiting online connections between brokers and insurance companies.

Quotation systems
Policy Master provides software that enables a broker to generate and compare quotes from a range of insurance companies. It offers packages covering private motor vehicle, commercial vehicle, home and contents, and life and pensions policies. The broker enters details of the prospect, and is presented with a list of the premiums quoted by different insurance companies, ranked according to price.

The broker can preselect the insurance companies to be included in the comparisons; the full list of motor insurers includes some 120 companies and 220 different insurance schemes. Brokers typically choose from a subset of about 12 companies, but may use several subsets for different types of business. They will run a comparison of the full set of companies if they cannot get a satisfactory quotation from a subset, and periodically, as a management exercise. The software is updated once a month to include new rates supplied by the insurance companies. Previously, brokers had to work from printed rate guides, backed up by telephone quotations; typically, they would compare two or three quotes on this basis, although they knew by experience which were likely to be the best companies for particular types of business.

Systems of this kind enable brokers to offer their customers a better service, but the costs are significant. Increasing computerisation favours brokers who sell the full range of types of insurance to their clients, and the larger operators, who can better afford the investment.

Validated-business systems
Up to 40 per cent of personal insurance proposals are initially rejected, usually because of errors. Policy Master has recently developed additional software modules that check a proposal to see if it can be accepted by an insurance company. It is currently concluding final agreements with the insurance companies to allow it to release the software to the brokers. A proposal will then be sent by EDI to the relevant insurance company over the IBM Information Network, IBM's managed data network service.

The advantages for the broker will be the ability to confirm acceptance of the proposal at once, and indeed, to have the policy printed out while the client is in the office. In addition, brokers are likely to receive a higher commission for validated business.

Insurer mainframe enquiry services
The network connection to insurance company systems will enable brokers to access online enquiry services provided by the companies — for example, to check on the progress of claims, and to reconcile accounts relating to commission payments. At present, brokers have to get this information from local branches of the insurance company. The direct access service will enable them to provide a better service to their clients by giving a more rapid response and being available outside the insurance companies' office hours — for example, on Saturday mornings.

Figure 3.4 An Australian state government uses a purchasing network both to reduce its costs and to promote local industry

Supplynet is a procurement network managed by Telecom Plus, the value-added services arm of Telecom Australia. It is used by the government of Western Australia for the procurement of supplies ranging from stationery to protective clothing, for which its total annual budget is A$1.2 billion. It is based on a system used successfully by the government of British Columbia in Canada.

The Australian project represents the implementation of a new supply strategy for the government of Western Australia, completed in 1988, that aimed not only to reduce the costs of supplies, but also to encourage smaller companies within Western Australia to participate in the tendering.

There are three elements to Supplynet. The first is a comprehensive directory of government contacts for different kinds of purchasing, and of suppliers and their known capabilities. The second is a database that provides information on government purchasing — both historical patterns and future plans. By providing such advance warning, the government hopes that small companies will have a better opportunity to respond, and indeed, to prepare creative solutions. The third element is the tender-tracking system, which maintains a list of tenders that are currently open, and allows suppliers to register interest or to lodge proposals.

Plans exist to use Supplynet in other areas of government, such as education, and to encourage the take-up of the system by other Australian state governments.

open public-sector tenders) and places it online using a third-party software system called Textract. Subscribers typically gain two days additional notice of new tenders, which can prove a significant advantage on short-term opportunities.

Purchasing systems allow customers to place orders over the system

Purchasing systems differ from the other types of systems described above in that they are interactive and allow orders to be placed over the system. An excellent example of the type is Formtrac, a system for purchasing printed stationery, described overleaf in Figure 3.5. Although such systems are still very much in their infancy, it is our view that they will become increasingly widespread.

In all four of the types of system described above, information technology reduces the cost and time needed to obtain information about suppliers and their offerings, and to compare different offerings. In rapidly changing markets, such as securities and foreign exchange, it is the instantaneous response, together with the ability to obtain truly simultaneous quotes, that is the prime value of electronic systems. In most other markets, it is the reduced cost of searching and comparing that brings the most value.

According to economic theory, the incremental cost of locating a new supplier for a specified product rises with each supplier found (because, in effect, the prospective customer has to widen the search each time), as does the cost of comparing the new supplier's offer with those already obtained. Conversely, the probability of the new quote bettering the existing best one falls as the number of quotes obtained rises. When the incremental cost equals or exceeds the expected gain, the purchaser ceases searching and plumps for the best quotation obtained so far. It follows that if purchasing systems reduce the cost of searching and comparing to a fixed level (the fee charged by the system operator), purchasers will end up buying at a lower price, as illustrated in Figure 3.6, on page 23.

Systems that facilitate spot purchasing therefore have considerable implications for suppliers, because they will increase the level of competition operating within a particular sector. Three other implications are worth noting:

— *Spot purchasing systems lower the entry barriers to a market.* Provided that a new supplier has something genuine to offer, participation in a substantive purchasing system provides many opportunities to quote, without the need to maintain a large sales staff.

— *Product information must be more standardised.* Information is presented to the purchaser in a standard form, and therefore has to be provided by suppliers in a standard format. In many industries, this has been resisted by suppliers who do not wish to facilitate comparisons. They see an advantage in retaining their current presentation format, in terms of branding, maintaining a corporate identity; and the presentational merits of their particular approach. Some systems — for example, Formlink in the UK insurance market — have anticipated the need to incorporate brand identity; while Formlink requires that crucial

Figure 3.5 A new electronic purchasing system facilitates quoting for printed stationery

ISTEL Purchasing Systems Ltd is a recent venture by AT&T ISTEL, a UK-based value-added data services operator, and represents a significant advance in the application of information technology to spot purchasing. In 1987, the company decided to look for new ways to combine its knowledge of the various industry sectors (such as pharmaceuticals and food) to which it offered systems services with its knowledge of value-added data services. The paper/stationery market provided a good match, so AT&T ISTEL developed Formtrac — a network-based purchasing system for stationery.

Most large users of printed stationery make their purchases through so-called independent distributors who are effectively brokers, but who in some cases, hold stocks for their clients. Formtrac is notionally aimed at connecting these brokers to print suppliers, although a few large purchasing organisations use Formtrac directly. Formtrac is, in essence, a system for handling supplier quotations and subsequent order processing. It also provides considerable management information and administrative functions such as ledgers and payments. It was developed out of a PC-based product written originally by Standard Continuous, a stationery supplier.

The purchaser specifies his requirements by filling in a set of standard forms on his screen (typically a PC with a modem to link into the network). The requirements may be for a fully customised set of forms, for a standard type of form (for example, four-part continuous A4) but with customised artwork, or for an ex-stock product. Formtrac immediately advises the purchaser of the number of suppliers on its records that have the technical capability to perform the job — based on 220 standard product classifications. The user then specifies which of these suppliers (possibly all of them) are to be sent an invitation to quote (ITQ) on the job.

The chosen suppliers will see the ITQ as incoming electronic mail on their own screens. Those that choose to respond will fill in a standard electronic quotation form specifying the price, delivery, and any constraints or differences from the required specification. The returned quotations are collated by Formtrac and presented to the original user, ranked by price. If there is a satisfactory quote, the user may initiate an order through the system. Suppliers are advised how many other suppliers bid for the job, but not who. In the event of an ITQ for a re-order, suppliers are advised of the value of their previous quote and where they were ranked in the final line-up. Several suppliers are apparently already investigating the possibility of connecting their existing computerised quotation systems directly into Formtrac and thus closing the loop. In the long term, it is conceivable that Formtrac may hold the quotation tables of suppliers inside the system (as is the case for the insurance networks, for example).

An important component of Formtrac is the concept of a 'trading relationship'. When a new purchaser or supplier comes onto the system, he signs a series of individual trading agreements with organisations that he chooses. A purchaser can send an ITQ through the system to any supplier, but that supplier will be advised whether he has a trading agreement with the originator. Moreover, a supplier can return an electronic quote only to such partners (although he can send quotes to others by facsimile). Companies are thus encouraged to have as many trading agreements as possible. One of the motivations for this exercise is to discourage, as far as possible, the generation of 'phantom ITQs' (where there is no intention to order the product). AT&T ISTEL maintains that suppliers very quickly learn to spot genuine ITQs from the phantoms.

By mid-1990, Formtrac was linked to 300 print suppliers and around 30 active users. The business-forms market in the United Kingdom is worth around £450 million ($900 million) annually, and ISTEL Purchasing Systems' objective is to handle 10 per cent of this market within its first full year of operation.

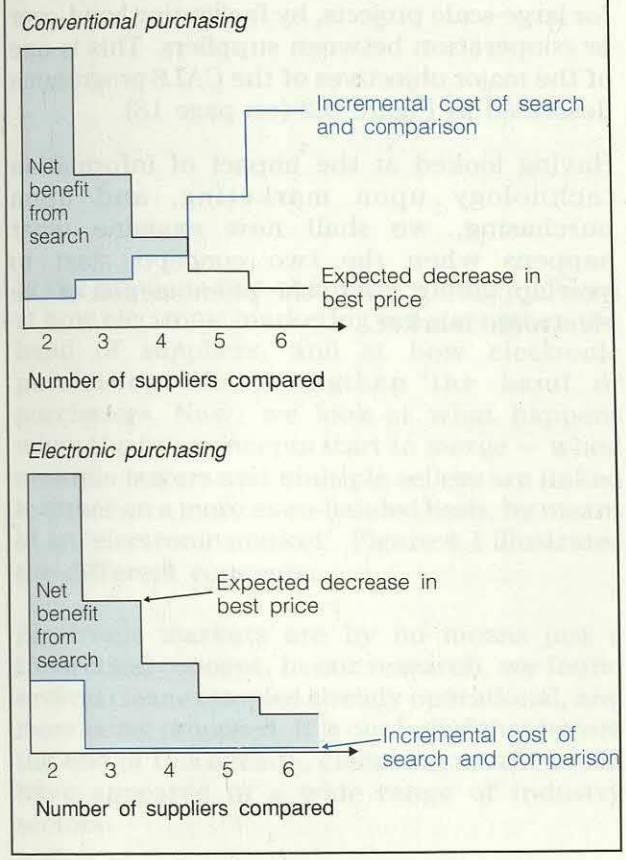
If this target is even approached, Formtrac will make a very significant impact upon the business-forms market. The obvious beneficiary is the customer; by reducing the cost of obtaining comparable quotations to almost zero, the customer is bound to end up with more competitive prices. There are, however, other implications, especially for the independent distributors (brokers). Although Formtrac is being deliberately pitched at these distributors (AT&T ISTEL believes that it is a mistake to try to introduce a new technology and change the structure of an industry in one go), large organisations can and will use the system directly. While there are undoubtedly some distributors who offer a real value-added service to their clients (such as warehousing or even anticipated ordering), those that do not face a difficult future.

Currently, the print suppliers also seem keen to get onto the system because it represents the opportunity to bid for more business. Formtrac is likely to accelerate the weeding out process, as the efficient suppliers gain more and more business at the expense of the inefficient ones. It may even generate new kinds of business opportunities; in Chapter 4, we make a prediction about how purchasing systems of this kind will eventually accommodate suppliers' offers as well as purchasers' requests.

information (including price) is presented in a standardised form, it allows suppliers to retain distinctive aspects of their presentation on-screen, including graphics and logos.

— *The role of price in the comparison is emphasised.* As more suppliers are admitted to the comparison, the importance of factors that can be conveyed in the space and format available is enhanced. This applies especially to price. Although the suppliers and the products for comparison are selected on other criteria — for example, specification — if several quotes meet the requirements fully, the final comparison will usually be made on price.

Figure 3.6 Information technology changes the economics of purchasing



The impact of systems facilitating spot purchasing on intermediaries — organisations acting in some capacity between the purchaser and the supplier — is even more acute than on suppliers. If the role of intermediaries in the marketplace is merely to put buyers and sellers in touch with each other, these systems seriously threaten their existence. To survive, intermediaries need to develop other ways in which they add value. We explore the implications for intermediaries more fully in Chapter 6.

Information technology will tend to shift the boundary between strategic and spot purchasing

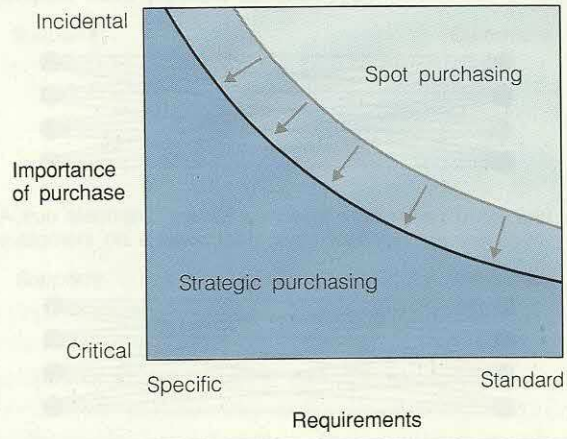
While developments in information technology will not eliminate the distinction between strategic and spot purchasing, they will tend to shift the boundary between them. In future, it will make commercial sense to transfer some strategic purchasing to spot purchasing, as illustrated in Figure 3.7. There are several reasons for this shift:

— *Purchasing systems reduce the time and effort needed to locate alternative suppliers.* Within the electronics industry, many smaller manufacturers purchase all their commodity components (resistors, capacitors, and so on) from a single supplier, simply because the cost of comparing alternative sources of supply with a long list of minor components has traditionally exceeded the savings to be gained. Electronic systems to facilitate spot purchasing of such components are now being piloted in the United States and other countries.

— *Flexible manufacturing systems reduce the overhead of tooling-up.* Another traditional reason for long-term supply relationships was the high cost and time penalty associated with a new supplier tooling-up for a new product. The advent of flexible manufacturing systems and computerised numerically controlled machine tools has reduced that overhead. The ability to exchange drawings and engineering specifications over a network reduces it still further.

— *Evolving EDI standards enable complex delivery schedules to be established rapidly.* A further source of overhead in the past came from the time taken for a new supplier to become familiar with the customer's requirements for delivery. Developments in EDI now make it increasingly possible to transfer complex call-off schedules at the

Figure 3.7 Electronic purchasing changes the boundary between strategic and spot purchasing



push of a button, and for the supplier's system to translate these automatically into manufacturing schedules.

— *Intangible factors, such as quality, are becoming increasingly quantifiable.* Factors such as quality have traditionally been assessed on a subjective basis, usually necessitating visits to the supplier's premises by the purchaser. However, now that quality standards are becoming well established (for example, the British Standard 5750), it becomes increasingly possible to assess a supplier's quality control standards objectively.

The flexibility provided by information technology can also help to decrease dependence on individual suppliers responsible for large-scale projects, by facilitating hand-over or cooperation between suppliers. This is one of the major objectives of the CALS programme described in Figure 3.2 (on page 18).

Having looked at the impact of information technology upon marketing, and upon purchasing, we shall now examine what happens when the two concepts start to overlap, giving rise to the phenomenon of the electronic market.

Chapter 4

Electronic markets

In the previous two chapters, we have looked at how electronic marketing can strengthen the hand of suppliers, and at how electronic purchasing can strengthen the hand of purchasers. Now, we look at what happens when the two concepts start to merge — when multiple buyers and multiple sellers are linked together on a more even-handed basis, by means of an 'electronic market'. Figure 4.1 illustrates the different concepts.

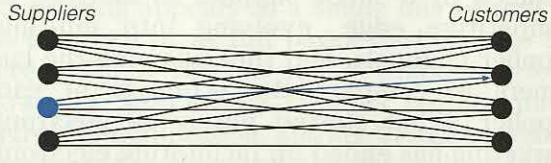
Electronic markets are by no means just a theoretical concept. In our research, we found several clear examples already operational, and more being proposed. It is our belief that before the end of this decade, electronic markets will have appeared in a wide range of industry sectors.

The impact of an electronic market emerging in particular industry sectors will be considerable. In economists' terms, those sectors will move closer to the concept of a 'perfect market', described in Chapter 1. In practical terms, the effect will be to increase the level of competition in those industry sectors, and in the majority of cases, that will be reflected in pricing. Scary as that may sound to many suppliers, the emergence of electronic markets provides as many opportunities as it does threats.

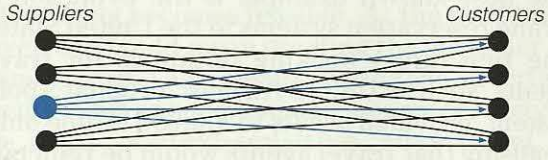
Perhaps the most dramatic effect of electronic markets, however, will be the move away from fixed pricing towards bid-and-offer systems. Several of the emerging electronic markets that we studied have been set up to accommodate bid-and-offer pricing from the outset. It is our belief that this practice will become increasingly widespread. Long-industrialised nations, used to fixed pricing, are going to find the adjustment difficult, as are organisations used to operating in very imperfect marketplaces. Those that have

Figure 4.1 Electronic marketplaces take several different forms

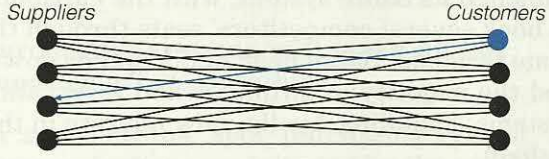
An electronic sales channel strengthens the link between a supplier and customer, to the principal benefit of the supplier.



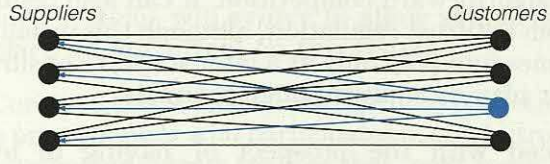
Electronic marketing techniques enable a supplier to tailor his offer to individual customers' requirements.



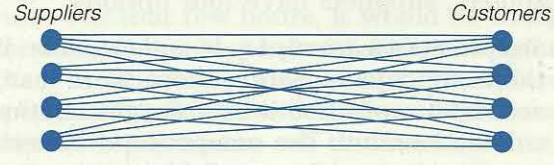
Electronic data interchange enables a customer to gain more from a strategic purchasing relationship.



An electronic purchasing system allows the customer to compare more suppliers at lower cost.



A true electronic market connects multiple suppliers and customers on a reasonably even footing.



already applied information technology to their marketing and purchasing operations, and those that employ techniques such as yield management will find the transition easiest.

Electronic markets will spring up from five different sources. We shall examine each of these in turn, and then look at some of the things that are needed to establish an electronic market.

Single-supplier channels will evolve into multiple-supplier channels

There are already several well documented examples of electronic sales channels, originally installed by a single supplier to increase his competitive edge, evolving into multiple-supplier channels, and thus allowing the customers to compare the offerings of each supplier. What started purely as electronic marketing has ended up facilitating electronic purchasing.

The best known example is the evolution of airline reservation systems in the United States. The first direct booking terminals for travel agents, such as United Airlines' original Apollo system, provided access to a single airline only. Realising that travel agents would be reluctant to have their desks increasingly cluttered with a set of different terminals, American Airlines launched its Sabre system, with the capability to book several competitors' seats through the same terminal. Sabre beat Apollo hands down, and the majority of airline-owned reservation systems, including Apollo, now operate in this fashion.

The driving force behind this evolution is usually straightforward competition. It can also result from antitrust regulation, although this usually comes into play only at a later stage, to ensure fair play on multisupplier channels.

Faced with the prospect of having to let competitors in on their cosy communication channels, to the immediate benefit of the customers, suppliers have four options:

— *Suppliers can attempt to bias the system.* In the early days of Sabre, there were many accusations of in-built bias, suggesting that connections into the competitors' systems were mysteriously 'unavailable' too much of the time, and so forth. Many of these accusations were never proven, however. The most controversial was the so-called 'first screen advantage' — requests for available flights always displayed American Airlines' flights first. US antitrust regulation now specifically outlaws any uneven treatment of carriers through airline reservation systems.

— *The channels can be turned into profit centres.* The original supplier can simply turn the system into a profitable business in its own right. The terminals are leased to users (travel agents, or large corporate users in the case of airline reservations), and both the suppliers and customers pay usage charges.

— *Market information can be used to optimise yield management.* This is more controversial, and we were unable to ascertain the extent to which it does or does not happen. In theory, the system supplier has access to more information concerning buying patterns than his competitors. This information can be very valuable in yield management, or even in planning new products and services. The practice is not illegal as such, although it may become so. One value-added network operator made his position clear: "We act purely as a postal service. Yes — we could steam open the electronic packets and read the mail if we wanted to. But we don't. Pretty soon that practice would backfire on us."

— *New business opportunities arise in value-added services.* The final option is to look out for new opportunities created by the system — what one commentator described as 'service station' opportunities. Possibilities, subject to other suppliers' agreement, include sale of aggregated data and market analyses. Another possibility is to supply additional non-competitive services through the system. Sabre now handles hotel and car-hire reservations, for example.

The most important thing for an organisation already operating an electronic channel, or thinking of developing one, is to foresee the possibility that competitors may offer multiple-supplier systems, and have a plan for reacting if they do. Such a plan involves technical as well as commercial foresight.

Ultimately, the majority of single-supplier channels will evolve into multiple-supplier channels, but some will evolve more slowly than others. Many channels have remained single-supplier for years, and look set to continue. The factors encouraging this include:

- *Discounted price mechanisms*. In the United Kingdom, most independent retail pharmacists have a terminal to just one of the major pharmaceutical distributors, because the distributors provide volume discounts that discourage pharmacists from shopping around. In our opinion, however, a major factor is apathy on the part of the pharmacists themselves. With a little concerted pressure, they could easily acquire a better deal.
- *Market dominance*. If an organisation is big enough, it can probably continue to operate a single-supplier channel for the time being.
- *Technical standards*. Whether deliberately or accidentally, in certain markets, differing technical standards have made integration difficult. The emergence of the separate Amadeus and Galileo pan-European travel-reservation networks had its origins in technical standards, although the original issues no longer apply.

Finally, there are situations where customers are quite satisfied with the service that they get from a single supplier's system and have no motivation to change. Those suppliers must be getting something right.

Electronic purchasing channels will start to accommodate electronic marketing

It could be argued that any electronic purchasing system that facilitates the comparison of multiple suppliers and enables the transaction to be initiated through the system is a form of electronic market. We have chosen to classify such systems as purchasing systems because they primarily benefit the customer. However, there are clearly fuzzy lines between electronic marketing, electronic purchasing, and true electronic markets. Arbitrary distinctions are somewhat less important that the emerging principles.

Electronic purchasing channels will unquestionably evolve into electronic markets when they start to accommodate electronic marketing. This comes about when the system permits suppliers, as well as purchasers, to initiate communications. We illustrate the principle with two examples.

Product locator systems will make electronic advertising possible

When users access Prodigy, the US-based home-shopping service described in Figure 1.1, a portion of their screen is reserved for advertisements from suppliers. (This concept will be familiar to users of teletext systems operated by commercial television channels, where advertising appears as a single line of text on each screen or as full pages flashed onto the screen for a few seconds.) Unlike teletext, however, purchasing systems require interactive communication, and are therefore usually implemented over the telephone line rather than broadcast airwaves. Since the identity of the user is known to the system, personalised advertising becomes feasible. At the most basic level, this could mean greeting the customer by name. It could also mean tailoring the advertisements to his or her presumed income or lifestyle, or even context-sensitive advertising — advertisements that appear on the user's screen only when he is making enquiries about relevant products or services.

Purchasing systems will make ad hoc supplier offers possible

In an electronic spot purchasing system, all communications are initiated by the purchaser in the form of invitations to quote. Suppliers can respond only with quotations. We believe that such systems will evolve to allow suppliers to place ad hoc offers on the system.

Consider this scenario, currently hypothetical: a print supplier who participates in an electronic purchasing system realises that, next week, he will have several hours' spare capacity between two large four-part A4 continuous stationery runs. For that few hours, it would be cheaper for the printer to produce similar stationery than to re-set his machines for a different specification. For those few hours only, it would therefore pay him to sell the machine time at below his normal rates. Conventionally, there

would be no economic way to communicate such an offer to more than a handful of regular customers. Supposing, however, the electronic purchasing system enabled the offer to be communicated to all the stationery buyers on the system. Suppliers and purchasers would both stand to gain. Similar situations can be envisaged for machine-tool time, or transportation.

Given that electronic purchasing channels provide the most immediate benefit to the customers, why should they allow suppliers to start using the same system for marketing purposes? There are three reasons:

- Ad hoc offers (as described above) can benefit customers as much as suppliers.
- Suppliers are not going to sit around and watch their power being continually eroded. Sooner or later, they will start banding together and demanding an equal right to initiate communications on the system.
- Supplier offers or advertisements provide a potential new source of revenue to the system operator. Customers are remarkably reluctant to pay explicitly for purchasing information even if it saves them money (witness the fact that most purchasing brokers charge a commission rather than a fee), so it is only fair to expect operators of electronic purchasing systems to exploit all potential sources of revenue.

Third parties will take the initiative in establishing new electronic markets

While the first two cases considered in this chapter may be described as electronic markets that have evolved from other systems (electronic sales and purchasing channels), there are also clear examples of electronic markets that have been established as such, from the outset — that is, electronic systems designed to connect multiple buyers to multiple sellers on a more or less equal footing.

While it is possible for a major supplier or customer to establish an electronic market directly as a separate business unit (such as Sears' involvement in the Prodigy home-shopping network), it is more likely that such markets will be initiated by third parties. We have identified four principal classes of electronic market maker.

Value-added network suppliers see electronic markets as a new service

Value-added network (VAN) suppliers are undoubtedly well placed to exploit the concept of electronic markets, both because they already have the necessary technological infrastructure, and because they are used to providing services to 'communities of interest'. Now, the VAN suppliers are starting to challenge some of the existing financial markets. In April 1990, AT&T ISTEL launched Unilink — a unit trust electronic dealing and information system. In the United Kingdom, such moves are being spurred on by a government view that private investors and small quoted companies are poorly catered for by the major stock markets. In the United States, Reuters, in conjunction with the American Stock Exchange, has announced plans for a new electronic market to trade private placement securities, capitalising on the new 'Rule 144a', which has lifted several restrictions on the trading of unregistered securities. They believe that the recent volatility of the quoted securities markets will make the trading of unregistered securities increasingly attractive.

Representative or regulatory bodies may establish electronic markets

Trade representative bodies have, on the whole, been remarkably slow to encourage the development of independent electronic markets, even though they are probably best placed to do so. There are more examples of government initiatives, either directly or through state-controlled monopolies. The government of Singapore has made a firm commitment to establishing electronic markets, and some of its initiatives are described in Figure 4.2.

Entrepreneurs can establish new electronic markets

Figures 4.3 (on page 30) and 4.4 (on page 31) provide details of two imaginative electronic markets established in an entrepreneurial fashion. The first, Transpotel in Germany, grew out of a publishing company, and provides a market in road haulage capacity. The second, Marketel in California, is a 'green field' start-up, aiming to generate a new market

Figure 4.2 Singapore is probably leading the world in electronic markets

The greatest concentration of electronic markets per square mile is in Singapore — increasingly known as 'the intelligent island'. The country has several inherent advantages from the viewpoint of investing in new information technologies, including its geographic concentration, and double-digit growth in the economy. The overriding factor, however, is a government with plenty of vision and little political opposition.

Singapore's national computerisation effort began in 1981, with the establishment of a National Computer Board, and was enhanced in 1986 with the National Information Technology Initiative — part of a wider plan to create a second 'S' curve in Singapore's economic development. Because of Singapore's history as a trading nation, several of the technology initiatives directly support trading.

TradeNet

TradeNet is an EDI network that facilitates the electronic submission of all trading documents to government institutions. For years, Singapore has run the most efficient container shipment port in the world, with a typical turnaround time of less than six hours. Containers were, however, held on the dockside for several days because of bureaucratic delays. With TradeNet, import/export approval takes 15 minutes, and is available 24 hours a day. The government also gets up-to-date and consistent trade figures.

Similar systems are already operating in the medical/healthcare, construction, and legal sectors, but perhaps the most impressive aspect of the initiative is the extent to which the technology has filtered down into the smallest of businesses, resulting in the nickname of 'electronic sweatshops'.

Bidding for export quotas

All of the 300 garment manufacturers in Singapore, for example, are connected online to the Ministry of Trade and Industry via a terminal or PC with modem. Under the Multi Fibre Agreement, garments exported to most countries are subject to strict quotas, within several hundred categories — such as men's short-sleeved shirts. Once assigned a portion of the quota, it is still up to each firm to find buyers for its products.

Previously, export quotas were assigned largely on the basis of the extent to which each manufacturer fulfilled its previous year's quota — in other words, with very little flexibility. Now, 75 per cent of the quota is assigned on that basis, but 25 per cent goes into a pool against which firms can bid, via their terminals. There are 10 rounds of bidding each year, and the result of each round is announced (electronically) within a week of the closing date.

In each round, a firm can submit up to five bids against each category. Each bid specifies a quantity and bid value. For example, in category 234, bid one may be 10,000 at S$45 per dozen, and bid two may be 5,000 at S$32 per dozen. The value bid is a quota fee — it goes to the government and is not directly related to the eventual price of the goods. The bid fee therefore reflects the manufacturer's expectations for the profitability of each category, and ranges from much less than 1 per cent of the final value of the goods to a staggering 30 per cent. When the round is closed, the government fills up each quota, starting with the highest bid price and working down.

The government is increasingly keen on competitive bidding as a fair mechanism for regulating supply and demand — a concept that electronic markets greatly facilitate. Use of pollutant CFCs within the electronics industry, for example, is now subject to volume quotas, and manufacturers must bid for licences.

Traffic control

Even the consumer is being drawn into the market process. As part of an effort to reduce traffic congestion, consumers must buy an expensive licence to purchase a new car. The government tries to regulate demand by altering the price of the licence. In 1990, the system was changed: the number of new licences available is now fixed, and consumers have to bid for them. Although this bidding system is currently paper-based, it is the ability of information technology to handle the administrative complexity that has enabled the switch to be made from demand control to supply control. Tenders have now been requested for electronic traffic control: transponders in cars will charge users for the roads that they use, with prices varying by time, and by day.

Teleview videotex services

With these and other electronic markets in mind, Singapore Telecom has recently launched Teleview — the country's first videotex service, but a significant advance on other national systems. Teleview is multilingual, and it handles (625-line) picture-quality graphics. To achieve the required bandwidth, Teleview uses a hybrid system — pages are requested over the telephone line, but transmitted via a broadcast TV channel. Singapore Telecom believes that the key to the success of the project lies in home education — almost a dirty word in many Western countries, but a major market in Singapore, where a very high proportion of families pay for extra-curricula tuition.

Singapore has traditionally dominated trade in South East Asia through its strategic location on the shipping lanes. With worldwide shipping now in decline, and growing economies in its neighbouring territories, Singapore has set itself a new strategy of dominating the information highways in the region, and hence, the electronic markets. Other countries do not necessarily have all the same opportunities, but their governments would do well to pay heed to these developments.

in travel facilities. It is far from certain that the latter will achieve the funding and the commitment from the suppliers that it needs to succeed. Nevertheless, it is our view that by the end of this decade, the concept being promoted by Marketel will have permeated many industries.

Figure 4.3 A German publisher manages an electronic market in road freight transport, linking carriers and customers

Transpotel is a subsidiary of Deutsche Verkehrs Verlag, a publisher of newspapers and periodicals for the transport sector. Transpotel operates a locator service for road freight transport, intended to match spare capacity on the part of carriers, to the ad hoc transport requirements of customers. Since trucks within Europe operate at an average of just 60 per cent of capacity, and the costs of running full and empty are very similar, the system has considerable potential for increasing profitability.

Transpotel was initially established as an international operation, catering to a range of transport sectors, and providing a variety of commercial services over its network. This was not a success: the scope was too broad, the plans too ambitious, and the technology unsatisfactory. The company was relaunched on a national basis in Germany, focusing on road transport, with partner organisations running similar services in Switzerland and the United Kingdom.

In Germany, customers can access the Transpotel network via two different technologies: the public videotex service (BTX), and the General Electric Information Services Mark III data network. The latter permits access to the system from outside Germany, and is also faster to use. Transpotel reports that customers were reluctant to purchase dedicated BTX terminals, but that with the spread of PCs and the availability of low-cost BTX adaptor cards (DM1,200 ($800)), the videotex service remains popular. Typical BTX access charges are DM150 ($100) for one hour's use per month, plus DM1.50 ($1) for each additional minute. The General Electric network charges are higher.

At present, most of the 400 users are German, although many of the shipments are international. In principle, the system handles all types of cargo, although it tends to deal with larger loads of between 5 and 40 tonnes. Major transport companies, such as Haniel and Schenke, use the system, but it is probably the smaller companies that stand to gain the most. Both customers and carriers appear to use the system only when they have exhausted their regular business channels and contacts. Usage levels vary considerably as a consequence: sometimes, there is a predominance of carriers' advertisements; sometimes, there is a predominance of potential customers. Transpotel offers closed user groups, and these enable companies to elicit bids from in-house or favoured carriers before opening them up to the general market.

Transpotel operates only as a locator service — when a match is found, the price and contract are negotiated by conventional means. In the early days, the system generated a new business opportunity for electronic brokers, but Transpotel now discourages this by checking, as far as possible, that users are *bona fide* carriers or customers before allowing them access. Full names and addresses are attached to every advertisement to discourage 'phantom' bids.

Although successful, Transpotel is as yet too small to make a significant impact on the market as a whole. The company is predicting substantial growth after 1992, both from the general rise in trans-border traffic, and from the abolition of cabotage — national restrictions on the use of foreign carriers for internal transport.

Decentralised organisations will start to operate internal electronic markets

The fashion in business management increasingly favours decentralised operations, devolved responsibility and accountability, and flattened management hierarchies. Although such moves bring several advantages in terms of efficiency, responsiveness, and personal motivation, they also bring new problems. One of the problems concerns trading — both in terms of trading with external organisations, and internal trading.

For example, where an organisation comprises several producing and several consuming operations (perhaps factories and national sales organisations), and each functions as a near-autonomous profit centre, mismatches of supply and demand can occur. In the absence of tight central planning, it is quite possible for one producing unit to have over-capacity while others are unable to meet all their orders, or for one consuming organisation to have surplus stock while the others are unable to supply their own customers.

In extreme cases, this situation can be exploited by third parties. One large organisation told us that it had discovered that an external organisation was buying components from one part of the company, and selling it to another part of the same company, with a mark-up in between. Similar situations can occur in external trading where customers attempt to play one part of a decentralised supplier against another to gain the best price.

What applies to marketing applies to purchasing in reverse. Decentralised organisations not only lose the benefit of volume purchasing; they can also end up paying a variety of different prices to the same supplier. Internal electronic markets may provide at least part of the solution to the problems inherent in decentralised operations.

Figure 4.4 A start-up company in the United States plans to establish an electronic market in travel facilities

Marketel International Inc is a start-up company based in San Francisco, whose aim is to establish a true electronic market in travel facilities. The idea is that would-be travellers will enter 'bids' into Marketel's trading system, indicating their requirements and the price that they are prepared to pay. An example bid might be: "I wish to fly from Los Angeles to Hong Kong between 27 and 29 January, and I am prepared to pay up to $400 for a seat".

The idea is that these bids would be matched to offers placed on Marketel's trading system by travel suppliers such as airlines and hotels. The likelihood of a particular bid being successful depends on how realistic it is, but also on the load factors of the suppliers. Many major travel operators now employ sophisticated yield-management systems — so if demand is low on a particular day, it can pay them to accept a low bid.

According to William S Perell, senior vice-president of Marketel, the system would offer benefits to both suppliers and customers. "The customer gets the possibility of paying a lower price in return for accepting the burden of increased uncertainty — both uncertainty of success and uncertainty of the supplier brand." Suppliers get the chance to generate additional marginal revenue, without having to publish reduced prices.

At least, that is the theory. Marketel spent several months trying to persuade more than 50 US airlines to support the concept. While some agreed that this kind of development is inevitable, none was ready to make a commitment to it at this stage, either because of the technical difficulties of interfacing their yield-management and reservation systems to the market, or because they feared a price war.

Marketel has now refocused on the hotel business, and hopes to have several hotel chains signed up, and the system operational, early in 1991. Bids will be entered into the system by facsimile: customers write their requirements onto a standard form, and these are machine-read by Marketel's computer systems. Perell believes that the use of facsimile is critical to the success of the project, because it gives customers a signed, written version of their requirements, backed by a credit card. This eliminates the huge cost of dealing with misunderstandings, changes of travel plans, and disputes.

The success of the venture is far from guaranteed; pioneers have to bear the high cost of educating the marketplace as well as developing the systems. Within a few years, however, such systems are likely to be commonplace in a wide range of industry sectors.

Internal electronic markets can function at two levels. The first entails exchange of information and intelligence, relating to deals made or offered, to market activity, or to competitors' positions. The second entails actual trading, where the electronic market serves to match internal supply and demand by providing a variable price mechanism. It is important to realise that such internal markets are not restricted to trading in an organisation's principal commodities (oil or integrated circuits, for example). They can be applied to any number of resource-allocation problems: capital finance, labour, computer time, use of a mailing list, promotional opportunities, and so forth.

Installing an internal electronic market is usually easier than installing an external one, especially if the organisation already has a telecommunications network in place, and standards for personal computing. There are some nasty pitfalls, however. The biggest of these can be getting managers to use the system. One organisation told us of tremendous difficulties in this regard: its decentralised operations were not at all keen to share their market intelligence with what they effectively regarded as competitive business units. Everyone was keen to get the information out of the system; nobody wanted to put the information in. Resolving such problems requires a delicate mix of stick and carrot — enforcing the use of the system for all internal trading, while ensuring that the benefits of so doing are clearly visible to the participants themselves.

If successfully introduced, however, internal markets can provide benefits in addition to relieving the problems already outlined. Electronic markets, for example, can identify so-called Chinese trading opportunities — where an organisation is purchasing different items from different parts of another organisation, with the possibility for an amalgamated deal.

The other principal advantage is the possibility for extending an internal market outside the organisation to customers or other suppliers. Initially, new suppliers might be restricted to non-competitive products with a similar market structure. In the longer term, however, it also allows for the possibility of becoming a market maker in competitors' offerings.

Existing markets can be converted to electronic trading

Electronic markets can also emerge when existing markets are converted to electronic trading. 'Market' in this context refers to an identifiable forum where multiple buyers and multiple sellers meet to trade. The best examples of such markets are the markets in securities, foreign exchange, futures and options, commodities, and agricultural auctions. Many of these markets are increasingly supported by information technology, at several different levels.

Information technology can disseminate price quotations and offers

At this level, computers function like electronic tickertape, enabling the trader to view and compare many different prices simultaneously. Examples of such systems include the Reuters and Telerate foreign exchange information services. Deals still have to be struck on the telephone.

Information technology can confirm and administer a transaction

Once a deal has been agreed, usually on the telephone, information systems can perform most of the administrative functions associated with the transaction. This will, first of all, entail matching the two sides of the deal: both sides will have entered their understanding of the deal into the system, but these need to be matched and confirmed (or any discrepancies clarified). Second, it may entail the clearance and settlement process, when payment is made, and title to the goods is formally transferred. The London International Stock Exchange is developing a new automated clearance system, Taurus, for this purpose. At the most advanced level, systems can effectively deliver the goods. The Singapore Stock Exchange now has fully paperless trading: even the share registration (the final link in the chain) is performed electronically.

Information technology can close the loop between quotation and confirmation

At the next level up, it is possible to transact a deal entirely through the screen and keyboard, without the need for personal contact between dealers. This happens in two different ways, depending on the type of market. In an order-driven market, such as the Tokyo Stock Exchange, dealers enter buy and sell orders into the market. Rows of clerks, or now, computers, look for possible matches between buy and sell orders, within margins specified on the orders. If a match is found, the buyer and seller are advised that the transaction has taken place.

In a quote-driven market, such as the London and New York Stock Exchanges, all dealing in a particular stock takes place through a limited set of registered market makers, who are obliged to quote both buy and sell prices continuously. The trade usually takes place with the market maker offering the best price of the moment ('on point' in the jargon).

Information technology can automate the transaction in either case, although it is probably true to say that automated transactions make more of an impact on order-driven than quote-driven markets. As an aside, many of the arguments for quote-driven systems (such as the fact that they enforce a minimum level of liquidity, and increase the stability of the market) are now being questioned. Newer exchanges tend to favour order-based trading, and we expect this trend to continue, especially with the increase of screen-only markets.

Information technology can automate the decision to trade

Automated, or so-called 'program' trading, takes several different forms. The first is in searching for arbitrage opportunities — short-term discrepancies between the price of a particular financial instrument on two different markets, or between the price of an index (such as the Standard & Poor 500 index) and the prices of the individual components that make up that index (the 500 stocks in that case). By identifying these opportunities the moment they arise, arbitrage dealers can make short-term gains, before the differences disappear again.

Another form of program trading is 'basket' trading — the facility to buy and sell a large set of different stocks as a single transaction. A third example is the used of 'trigger points' — effectively, automated decisions to buy or sell financial instruments when their price reaches

a certain point. The fourth, and most recent, form is the use of 'quantitative models' running on PCs to identify stocks and bonds that are undervalued, by means of mathematical analysis and artificial intelligence techniques. Figure 4.5 lists some such systems in use today.

Program trading is the most controversial of the innovations resulting from information technology, and indeed, it is banned on several exchanges, including London.

An electronic market maker needs technology, standards, and influence

The foregoing examples of how electronic markets arise demonstrate that there are no arbitrary restrictions on who can become the market maker. However, it would be wrong to imply that any organisation has the means to become the market maker. There are three requirements for establishing a new electronic market, and all three must either already exist within the marketplace, or must be supplied by the market maker.

A technological infrastructure is needed to connect the participants

For the majority of electronic markets, participants are going to need terminals, a network to connect them, and a computer system to manage the central functions. Establishing a satisfactory system is not now technically difficult, but it takes considerable time and investment. The alternative is to build a market on a system that already provides much of the technical infrastructure, such as an electronic mail or a videotex service.

Trading procedures within the market need to be standardised

This is the requirement most easily overlooked. If bids and offers are to be matched, quotations ranked in price order, or tenders circulated to all appropriate parties, the contents of all communications must be standardised, not

Figure 4.5 Several major financial institutions now employ artificial-intelligence-based systems to assist in trading decisions

Sanwa Bank Computer Systems
Tokyo, Japan
System: Financial Adviser
Type of system: Rule-based
Designer: In-house
Hardware: Hitachi PC
Installation: 1986
Purpose: To provide customised investment portfolios for customers

Manufacturers Hanover
New York, US
System: Technical Analysis and Reasoning Assistant (TARA)
Type of system: Financial modelling
Designer: In-house
Hardware: Symbolics
Installation: 1988
Purpose: To identify profitable arbitrage opportunities between the US cash and futures foreign exchange markets

Associated Family Services (AFS)
New York, US
System: Intelligent Portfolio Manager
Type of system: Rule-based; pattern recognition
Designer: Intelligent Technology Group
Hardware: IBM 386PC
Installation: 1987
Purpose: The purpose of this system is to 'beat' the S&P500

Mutual Life of Canada
Waterloo, Canada
System: Financial Analysis Support Tool (FAST)
Type of system: Financial modelling, object-oriented
Designer: In-house, but based on Intellicorp's KEE shell
Hardware: Sun workstation: Compaq 386
Installation: Autumn 1988
Purpose: To provide a customised investment plan for customers

Shearson Lehman Hutton (SLH)
New York, US
System: No brand name
Type of system: Rule-based
Designer: SLH, Inference Corporation, Coopers & Lybrand
Hardware: Texas Instruments' Explorer LISP processor
Installation: 1986
Purpose: Forex arbitrage between cash and futures markets

(Source: Essinger, J. AI applications in financial trading and investment management. *Expert Systems User*, vol. 6, no. 8, August 1990.)

merely the delivery mechanism or 'electronic envelope'. The growth of EDI has smoothed the way by creating standards for electronic orders and invoices, delivery notes, and payments. The EDI standards bodies are already working on similar standards for quotations, product cataloguing, price lists, enquiries, and more.

Products and services also need to be standardised or defined in a way that enables them to be specified by a small number of parameters. The vegetable market at St Pol de Léon in Brittany now functions electronically, without a vegetable in sight. The enabling factor was the introduction of a reliable system for grading produce.

Potential participants need to be persuaded

Even with all the technical elements in place, the biggest problem will probably still be reluctance on the part of potential participants to become involved. The more influence a player has over potential participants the better: regulatory influence is best, market dominance is next best, and representative influence (as in a trade body) a third option. Potential market makers with none of these will have to fall back on personal powers of persuasion.

In this chapter, we have described five ways in which new electronic markets — that is, systems that connect multiple suppliers to multiple customers and that will generally facilitate the operation of market mechanisms such as variable pricing — will evolve. We have portrayed electronic markets as a good thing: we believe that shifting many industry sectors nearer to perfect markets makes for fairer competition, to the good of the economy as a whole. While electronic markets will undoubtedly threaten the very existence of some players, they also provide many new opportunities for organisations that have something to offer.

However, electronic markets are not static structures; they tend to evolve. The way that they evolve can improve the operation of a market, and can sometimes hinder it. In the next chapter, we shall therefore look more closely at the way that markets change once they start to function electronically.

Chapter 5

Changing market characteristics

No one who has any involvement in securities, foreign exchange, commodities, or futures trading can dispute the impact that information technology has already made upon those markets. Yet few people foresaw the full scale of that impact. When the London capital market was deregulated in the 'Big Bang' of 1986, paving the way for electronic trading, many pundits predicted that only a small proportion of trade would disappear from the floor of the Stock Exchange itself. Within a matter of weeks, the floor was deserted. In the United States, NASDAQ, a purely screen-based securities trading market, is now the second largest stock exchange, and the third largest in the world.

Information technology changes the characteristics of markets in two principal ways. First, it widens the markets, both in terms of the geographical reach, and the range of products that they handle. Second, it increases the responsiveness of markets, and this in turn tends to lead to greater volatility. In other words, the impact of information technology can be both beneficial and detrimental. After describing each of the principal effects, we shall examine the case for regulation in electronic markets.

The effects we describe are most observable in the financial and commodities markets, where information technology has been making a considerable impact for some years. However, the same principles will eventually apply to any market that functions electronically, whether it is in insurance, airline tickets, or groceries.

Information technology widens markets

Information technology has the potential to widen markets in terms of existing and new players, and in terms of the number and sophistication of products that can be traded.

Electronic links extend the reach of markets for existing players

Instead of requiring physical presence on the trading floor, electronic links make it possible for a trader to participate from his own office, from a different city, or from a different country. Computerised logging and matching of orders can also extend the hours during which the market is open, facilitating trading outside normal office hours.

This ability to trade across continents and time zones is encouraging the spread of truly global trading. Globex, the automated trading system of the Chicago Mercantile Exchange (CME), introduced in 1990, is a direct attempt to arrest the exchange's falling share of the world futures business. The CME is seeking to install Globex screens in European and Far Eastern markets, as well as allowing other exchanges to post their wares onto the system.

Sotheby's, the London-based auctioneers, has conducted a trial using videoconferencing for fine art auctions. Participants could view the sale item, monitor the proceedings, and register bids from thousands of miles away.

Electronic links will encourage the entry of new players

Electronic markets will not make it any easier to compete in the market, but they will make it easier for new players to participate in the market, without the need for expensive premises, a large staff, and substantial networks of contacts and sales agents. Figure 5.1, overleaf, tells how one Irish company, Cognotec, has successfully widened the market for treasury services. In effect, it has mimicked

Figure 5.1 Using an electronic network, an Irish company has widened the market for treasury management services

Large corporations undertaking substantial treasury management, including foreign exchange and money market investment, can afford to gain access to the same kind of information and trading services as banks and financial institutions — services such as Reuters and Telerate. For most smaller companies, treasury management is usually conducted through banks — a source of easy profits for many banks.

Cognotec, an Irish company with a London-based operation, offers an online service specifically aimed at UK corporate treasury managers. The service provides realtime foreign exchange and money market rates, with quotations from eight major banks, including the four major UK clearing banks. The banks supply electronic pages of information concerning their products and services, and in addition to these, there are special pages on which the rates of all the banks are compared. As with the mainstream services, these displayed rates represent advertisements rather than binding quotations.

The system can also be used to initiate transactions via the screen. To do this, the corporate treasurer can obtain up to three simultaneous quotations from different banks, and select the one to be initiated. At the bank's end, the dealer can handle five simultaneous requests for quotes on his screen.

During this quoting process, customer and dealer can exchange short messages on the screen. Market research showed that loss of the human interface was a major concern, and the messaging facility compensates for this. However, by eliminating much of the smalltalk, the system enables dealers to be far more productive — in particular, it reduces the need for the dealers to ring regular customers with market updates. With a fully loaded cost of between £100,000 ($200,000) and £150,000 ($300,000) per dealer, streamlining the relationship with corporate treasury departments can represent substantial savings to a bank, thus compensating for loss of other commissions.

Thus, although Cognotec will undoubtedly change the balance of power between banks and their corporate customers, most banks seem to be taking the view that such moves can generate new business. In the long run, encouraging greater sophistication in their clients will enable the banks to widen their market for more complex financial products with higher added value. Some of the banks use the service internally to provide a better service to customers who do not have a terminal, and Barclays Bank operates a closed-user-group analysis package for its own dealers via the Cognotec network.

The service uses videotex display and page-formatting standards. The information can be presented on videotex terminals, or fed into a PC. Some customers connect it into their own systems — for example, they may take the confirmation messages directly onto their accounting systems. The service is delivered on the AT&T ISTEL managed data network, with most customers gaining access via dial-up lines.

The service has some additional features. It provides analysis and calculation pages, so that treasurers can perform the calculations they need to use the information provided. For example, they can calculate forward rates for broken dates (dates in between those for which standard rates are quoted). Outputs from the analysis pages can be used directly to specify a series of transactions. There are also facilities for displaying graphs to show trends, and for accessing other information sources such as British Telecom's Citicall — a financial news service.

the technology of the mainstream financial markets and applied it to the corporate market.

New products or markets can be more easily introduced

Products and trading procedures that are heavily supported by information technology can easily be transferred to a different environment. Thus, instruments successfully introduced in one market can be quickly established in another, either a similar market in another locality, or a market in a different kind of produce. Mexico and Korea, for example, are now considering establishing their own futures markets, largely by buying in proven systems from elsewhere. On the Pacific coast of the United States, two exchanges are now discussing the possibility of a futures market in DRAMs — the memory chips for personal computers — which have fluctuated between over-supply and scarcity over the last few years.

Greater product sophistication is possible

The ability of information technology to manage enormous complexity has encouraged markets to trade in derivatives — products that are derived or constructed from the more basic products such as stocks and bonds. Derivatives such as futures contracts (contracts to buy something at a specified future date and price) or options existed long before information technology appeared, but the derivatives are becoming more complex. One example is index trading, where traders are effectively speculating on the movement of an index or basket of stocks, rather than actually buying or selling the stocks themselves. Another is securitised mortgages, where several personal property mortgages are packaged together and then sold to the financial markets as a series of bonds. For connoisseurs of derivatives, a futures market in insurance is now being discussed by London brokers and the Chicago Board of Trade.

Information technology plays two roles in the creation of new products. First, it facilitates the complex calculations associated with such products, especially where a single transaction must immediately be translated into a large number of quite different buy and sell orders. Second, by being able to communicate the features of a new product quickly and effectively to all potentially interested parties, it becomes easier to achieve the minimum desirable level of liquidity.

The converse is that it becomes very easy for competitors to copy a successful new product. In the United States, securities houses are now attempting to patent new types of financial instrument. None of these patents has yet been contested, nor have there yet been any suits for infringement, but that is only a matter of time.

Markets become more responsive, and more volatile

The most noticeable effect of information technology upon markets — at least, the effect most noticeable from the outside — will be the increasing responsiveness of the markets. As news and developments are disseminated faster, as the effort needed to strike a deal is reduced, as derivatives translate a single deal into a multiplicity of transactions, and as automated triggers generate transactions from market events, so the speed of response increases.

Traditionally, this is viewed as a good thing. Removing 'friction' from a market by simplifying the trading processes and making it more sensitive to changes helps create a near-perfect market. That, in turn, eliminates wrinkles and irregularities in the market, so that, theoretically, prices end up reflecting the real value of the products in the marketplace.

That view is starting to be questioned. The notion that increased responsiveness holds prices closer to their true values seems to hold good only up to a certain point. Beyond that, further responsiveness seems only to unhinge the prices from their true values. One foreign exchange trader expressed it to us like this: "A foreign exchange rate should reflect the economies, and in particular, the relative trading positions of the two countries. But in recent years, the exchange markets have become so volatile that the rates have become completely decoupled from the underlying economics. Now, the rates reflect only the expectations and moods of the traders themselves."

The economist, John Maynard Keynes, compared such markets to beauty contests featured in tabloid newspapers, where contestants must guess which entrant will be judged the winner by a panel of judges: the goal is not to assess which girl is the most beautiful — it is to assess which girl will be most beautiful in the eyes of the judges. When all players work in this way, the result can be surprisingly different from the real opinions of the players.

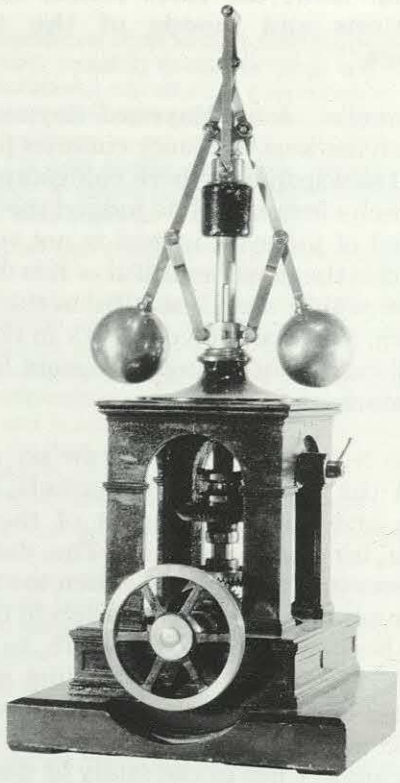
In Figure 5.2, overleaf, we draw an analogy between the way in which markets become unstable and the development of the flyball governor for steam engines. The danger of analogies is that they can be taken too far, but there are some interesting parallels in this one. Might it become possible, in future, to predict the point at which this uncoupling starts to occur, and thence to model the movements of the prices themselves? Some theorists believe that the answer lies in the study of non-linear deterministic systems — popularly, but misleadingly known as chaos theory. It is just possible that there may be some mileage in this, and that is one justification for continuing the research, but it will be at least a decade before there can be any useful application of the theory to this arena.

For the next few years, at least, we shall have to tolerate increasing volatility and increasing unpredictability in the behaviour of these highly automated markets. On the whole, those outside the market tend to take the attitude that players inside the market know the risks and must bear the consequences: those that live by the sword must expect to die by the sword. From time to time, however, the volatility of those markets starts to make a wider impact, such as the crash of October 1987. Such events precipitate calls for greater regulation.

Electronic marketplaces need regulation

Few people dispute the need for some kind of regulatory intervention in markets, but there

Figure 5.2 Increased sensitivity can eventually lead to instability



There is an interesting parallel between the development of electronic markets and the development of steam engines. When the flyball governor (pictured here) was invented in 1788, it significantly advanced the application of steam engines by enabling constant speed to be maintained under varying loads. The principle is simple: if the engine speed increases, the rotating weights fly outwards, and this in turn, through a mechanical link, closes the throttle slightly.

It was assumed that increasing the sensitivity and reducing the friction in the mechanism would improve performance, and this was so, up to a point. Beyond some seemingly critical point, the engine merely became unstable, with violent oscillations in speed. This phenomenon remained a mystery for more than 80 years, until James Clerk Maxwell developed a comprehensive theory of feedback.

Electronic markets, some would argue, are necessarily a good thing because they increase the sensitivity and reduce the friction in a market. Functions like program trading and arbitrage tend to iron out any irregularities or inefficiencies in the market. Up to a point, that must be true, but in the crashes of 1987 and to a lesser extent 1989, we may have seen the first signs that an equivalent point of instability has been reached.

As yet, we have a very poor understanding of the dynamics of markets, in a mathematical sense. Linear control theory, pioneered by Maxwell, simply does not fit the results. The study of non-linear deterministic systems may provide the answers, but at best, it is several years away.

is considerable disagreement on the nature and the level of such regulation.

In financial and futures markets, the argument revolves around the central issue of the benefit of liquidity verses the 'evils' of speculation. In the Chicago-based commodities futures markets, only 3 per cent of the contracts traded actually result in the commodity being physically bought or sold. Much of the remaining 97 per cent is accounted for by speculation — traders with no underlying interest in pork bellies or orange juice, buying futures contracts and selling them on before the maturity date, hopefully at a profit. As pernicious as this activity may sound to outsiders, speculation contributes to the liquidity of the market. Indeed, the commodities futures exchanges were established to create such liquidity and thus to shield individual farmers or commodity-dependent industries from the massive seasonal fluctuations in the markets.

Electronic markets encourage speculation to a very high degree, because the information concerning market movements is more widely available and because the cost and effort of participation is reduced. This is one of the reasons that they attract regulation. There are four main issues related to the regulation of electronic marketplaces.

Electronic marketing raises privacy and data protection issues

As electronic marketing shifts the emphasis from matching the offer to the market as a whole, towards matching the offer to individuals, the question arises: just how much should companies be allowed to know about individuals, and what should be the limits on the use of that information? Currently, the situation varies from country to country. Figure 5.3 lists a few of the differences between member states of the OECD, as at December 1989.

One of the factors favouring the very strong direct marketing industry in the United Kingdom is that the law concerning the use of personal information for marketing purposes is currently quite relaxed. One of the few restrictions is that financial information, readily available in the form of credit references, cannot be used for marketing purposes. Our

Figure 5.3 Legislation to protect data privacy varies in different countries

The table shows some of the national differences between the legislation for data and privacy protection, either enacted or planned. While all the OECD countries have some sort of data protection laws either enacted or planned, some apply only to the public sector, some apply to computer files but not to manual files, and some apply only to certain industry sectors.

Country	Legislation applies to:				
	Public sector	Private sector	Computer files	Manual files	Particular sectors
Australia	✓		✓	✓	✓
Austria	✓	✓	✓		
Belgium	✓	✓	✓		
Canada	✓		✓	✓	✓
Denmark	✓	✓	✓	✓	✓
Finland	✓	✓	✓	✓	✓
France	✓	✓	✓	✓	
Germany	✓	✓	✓	✓	
Greece	✓	✓	✓	✓	
Iceland	✓	✓	✓	✓	
Ireland	✓	✓	✓		✓
Italy	✓	✓	✓		
Luxembourg	✓	✓	✓		
The Netherlands	✓	✓	✓	✓	✓
Norway	✓	✓	✓	✓	✓
Portugal	✓	✓	✓		
Spain	✓	✓	✓		
Sweden	✓	✓	✓		
Switzerland	✓	✓	✓	✓	
United Kingdom	✓	✓	✓		
United States	✓		✓	✓	✓

(Source: Present situation and trends in privacy protection in the OECD area. *Science, Technology, Industry Review*, no. 6, January 1990.)

research revealed that one financial services company was considering offering loans by direct mail, where the loan price (the effective rate of interest) would be geared to the recipient's credit rating. That may not strictly contravene the law, but it would appear to come very close.

Where markets introduce new methods of payment and settlement, financial regulation is needed

Methods of payment and settlement within electronic marketplaces are becoming increasingly diverse and fragmented. Electronic

funds transfer has attracted considerable attention and debate, both in terms of standards and security, as have the settlement systems of the major financial markets, but there are equally radical developments at the opposite end of the scale.

Prepayment cards (like the telephone pay cards used in several European countries) will become increasingly popular. They avoid the transaction costs and the verification delays associated with credit and debit cards, and are therefore particularly suited to small regular transactions. (One retailer we interviewed reckoned that credit card authorisations take an average of 40 seconds.)

Such cards will be increasingly cross-functional: in Switzerland, one prepayment card can be used to pay for telephone calls and to buy groceries at the Migros supermarket chain. In Denmark, experiments are being conducted with cards that can be topped up with loyalty points (the electronic equivalent to bonus stamps), or with refunds on returned bottles. In future, it will therefore be possible to operate entire closed marketplaces without the need for cash. Cashless markets can provide additional security, and enable the operators to adjust pricing easily and sometimes invisibly.

However, issuing prepayment cards is quite literally a licence to print money. In Japan, where the technology is most advanced, the supply of cross-functional cards is restricted to 15 licensed companies. In the world of banking, there are strict regulations concerning such things as the ratio of debt to equity, and the proportion of funds that must be placed with the central banks. It must be recognised that by the end of the decade, the traditional concept of a bank may well have been superseded by a range of new institutions and electronic mechanisms. They need regulation too.

Regulation over market stability is the most controversial

The most controversial area of regulation is almost certainly the extent to which market prices should or should not be allowed to go unchecked. The decision by the Hong Kong Stock Exchange to close its trading floor during the worst hours of the October 1987 crash attracted considerable criticism, although at least some of that criticism has come from markets that would have liked the power to do the same. The crash has given rise to a whole new jargon of electronic market intervention (circuit breakers, cooling-off periods, and damping mechanisms), but no consensus as to the right approach.

Much of the argument has centred on program trading. Dr Joseph Weizenbaum, a professor at the Massachusetts Institute of Technology, and the most outspoken critic of artificial intelligence, believes that the arrival of the PC on traders' desks has directly contributed to market volatility. In fact, this may be attacking the symptom rather than the cause: the current system of commissions encourages trading more than wealth creation — dealers are more frightened of a static market than of up- or down-swings.

Electronic markets provide new opportunities for anti-competitive behaviour

In theory, electronic markets facilitate better competition because buyers have access to more information concerning sellers, and vice versa. In practice, examples have already arisen of electronic systems being used for anti-competitive behaviour. Figure 5.4 tells one story of such alleged anti-competitive behaviour by US airlines.

The lesson to be drawn from this brief look at the impact of information technology upon markets is that while electronic markets offer enormous benefit both to competitive individual players, and to the market as a whole, they also bring with them new problems. Some of these problems can be avoided by establishing the right level of regulation and intervention, but we do not pretend that identifying or agreeing on that level is going to be easy.

Most of the decisions concerning regulation and intervention fall to governments and established regulatory authorities rather than to individual organisations. They are worth discussing, however, because individual organisations that are in the process of establishing or participating in new electronic markets need to be aware of the regulatory influences that they may be facing in due course.

Figure 5.4 Accusations have been made that electronic price-distribution networks are being used for anti-competitive practices

The US Justice Department has begun a series of investigations of possible antitrust violations in the airline industry. The suggestion, denied by the industry, is that although deregulation of US air travel was intended to further competition between carriers, to the benefit of the customer, airlines have found new and sophisticated means of subverting such competition.

One of the allegations concerns the publication of fare prices through the commonly owned network managed by the Airline Tariff Publishing Company in Washington. The network handles some 100,000 fare changes per day, and disseminates the information to travel agents. Critics suggest that some airlines use this network for very-short-term price changes, specifically aimed at discouraging competitors from opening up new competitive routes into what they regard as their principal or 'hub' airports.

In June 1990, *The Wall Street Journal* claimed to have found direct evidence of this by accessing the ATP price database. A typical scenario might run like this: a small regional carrier (A) lowers the price on a particular route in order to make it more competitive. The large carrier (B) into whose hub airport the route connects, instead of reducing its fare on that same leg, reduces its prices on all other routes that A also flies. Carrier A, unable to sustain such an attack on all its routes, withdraws its well intentioned reduction, whereupon, carrier B reverts to its normal prices. Critics hold that a significant number of price changes on the system represent nothing more than 'territorial signals'. They claim that some carriers even attach special codes to make clear their intention to the encroaching airline, such as 'FU' — which may or may not stand for Fare Undercutting.

Conspiring to fix prices is illegal under US antitrust law, but it is usually necessary to prove that an actual conversation took place between the conspirators. Where collusion takes place indirectly, through the medium of an electronic marketplace, the prosecution's only hope is to prove that a participant's action was 'contrary to its independent self interest'.

Chapter 6

Implications for business strategy

In the preceding chapters, we have identified numerous trends that will bring about important changes in the relationship of individual organisations to their markets, and in the operation of the markets themselves. To respond to these trends, organisations should, in the first instance, examine each of the tactical possibilities presented in the previous chapters, such as the use of precision marketing, or subscription to purchasing systems, and ascertain the appropriateness of each tactic to their own situation. Since this exercise must be conducted by the most senior managers involved in marketing and purchasing, it follows that those managers need to be fully aware of the possibilities of information technology.

We believe that in addition to this review of tactical possibilities, Foundation members also need to undertake a more strategic review, commencing with a 'SWOT' analysis. This involves identifying the strengths and weaknesses of their organisation in the face of emerging electronic marketplaces, opportunities presented by electronic marketplaces, and threats resulting from these developments. Figure 6.1 contains a checklist of the items that should be included. This analysis will provide Foundation members with the basis for a re-appraisal of business strategy in terms of their relationships with their own markets, both as suppliers and purchasers.

Suppliers should review their competitive strategy

In the short term, supplier organisations can exploit the possibilities of electronic marketing to gain competitive advantage, but in the longer term, when electronic marketing has been widely adopted, and when electronic purchasing and electronic markets start to develop in their sector, today's competitive strategies may no longer be effective. Although they may not realise it, many supplier organisations currently rely heavily on inefficiencies in the market — inefficiencies in geographical distribution, customer ignorance, or the high cost of comparing several suppliers' offerings.

Faced with the prospect of an electronic market developing, suppliers have three broad options — they may choose not to participate in the market, to use the electronic market as an additional channel, or to opt to compete fully in the electronic market.

Suppliers can choose not to participate in the electronic market

A supplier may decide that it is not in his interests to participate in the electronic market. He may have the largest share of the existing market, and foresee only a loss of that share if the market goes electronic. As a long-term strategy, staying out of the electronic market is very risky: a supplier must be certain of his customers' loyalty. In the short term, however, it may well be prudent to wait to see how the market develops before joining. It may wither for lack of support, or die if changing market conditions remove the opportunity it exploited.

One strategy for staying out of the electronic market is for organisations to appear to give it wholehearted support, while actually attempting to inhibit it. A related option is for them to ensure that the market does not take off unless it is set up on a footing favourable to them. In both cases, the favoured approach is to set up a 'talk shop' involving several organisations, which is almost bound to get bogged down in discussions. One example of this (some would claim) is the apparent commitment of the major computer vendors to the open systems

Figure 6.1 Checklist for a SWOT analysis

An analysis of the strengths and weaknesses of an organisation in the face of moves towards the electronic marketplace and of the opportunities and threats that such a move presents, should include the following topics:

Strengths and weaknesses

(The presence of the factors listed below is a strength; the presence of their opposites a weakness.)

Commercial

- Lower costs than competition.
- Competitive advantage in product specification.
- Relatively low investment in salesforce and non-electronic distribution channels.
- Strategic partnerships with important customers.

Systems

- A detailed, well maintained customer database.
- Detailed sales information available online from an historical database.
- Electronic channels to customers.
- Internal systems compatible with EDI, and EDI links with major suppliers.
- Efficient and integrated internal systems that facilitate a rapid response.
- Flexible production systems geared to just-in-time delivery.
- A corporate systems infrastructure to support electronic marketplace activities. This may include some or all of the applications listed above, provided in an integrated manner across departmental boundaries.

Staff

- Marketing staff with creative database analysis skills.
- Systems staff familiar with open systems and skilled at interconnecting systems from different suppliers.
- Systems staff familiar with the requirements of marketing systems and versed in the appropriate technologies and skills — for example, relational databases and user interface design.
- Hybrid staff — systems staff who understand business, and marketing staff who understand information technology.

Opportunities

- Set up electronic channels to improve service to existing customers or to reach new ones.
- Exploit customer database for more effective marketing to existing customers.
- Use internal sales data and geodemographic databases to identify and target groups of customers.
- Customise products to the requirements of individual customers.
- Adopt yield management to optimise revenues.
- Obtain supplies better matched to requirements through closer liaison with suppliers.
- Improve quality and timeliness of supplies through revised purchasing policies based on EDI.
- Reduce stockholding costs and improve flexibility by moving to just-in-time delivery.
- Reduce product development times through electronic exchange of design information.
- Take advantage of the potential of information technology to redistribute functions performed between an organisation and its customers or suppliers.
- Take advantage of information technology systems to improve the effectiveness of competitive purchasing.
- Introduce competitive purchasing for products or services currently procured non-competitively or supplied by in-house functions.
- Set up an electronic market.
- Take advantage of new business opportunities arising out of the operation of an electronic market.

Threats

- Players currently operating in geographically distant markets begin to compete.
- Removal of barriers to market entry allows in completely new players — for example, software houses and network service providers.
- Current competitive advantage over other competitors is lost — for example, strengths in salesforce or distribution channels.
- Basis of competition shifts unfavourably — for example, to price.
- Corporate or brand identity is lost in new marketplace.
- Competitors set up exclusive electronic sales channels, or operate new market.
- Competitors develop an advantage that is difficult or expensive to match — for example, selective marketing based on a comprehensive customer database.
- Customers deal direct with suppliers.
- Customers or suppliers take over functions currently performed by the organisation.
- Customers insist that the organisation take on functions that it cannot perform economically.
- Customers require new levels of performance that the organisation has difficulty delivering.

committees. Adam Smith, the father of economics, reckoned that "People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public or in some contrivance to raise prices".

A better long-term strategy is to change the basis of competition to some factor less readily represented on an electronic screen. Examples include after-sales service, quality, visual design, or product development cycle time. Where such factors dominate the purchasing

decision, an electronic market that focuses on price comparisons can be made irrelevant. It may even be actively avoided: experience has shown that many luxury goods do not sell on electronic channels. Partly, this is because the pleasure of the shopping experience can contribute to the value a customer obtains from a luxury item, and partly, because shopping on price would be seen to be at odds with the very nature of the luxury purchase: it is said of Rolls-Royces that "if you have to ask the price, you can't afford one".

The final option for those wishing to stay out of the electronic market is to establish strategic partnerships with key customers who have particular requirements for quality, timeliness of delivery, or customised products, and deliberately move out of the main competitive arena.

Suppliers can use the electronic market as an additional channel

A supplier may not wish to route his main business through a newly emergent electronic market, but may use it to supplement his existing sales channels, either to reach new markets or to circumvent imperfections in existing markets. Examples of the former include attempts by farmers and wine shippers to sell direct to the consumer via videotex systems. Examples of the latter include the use of the Transpotel system by road hauliers to fill up vehicles on journeys to which they are already committed, and the use of systems that automatically execute trades in securities for small transactions. Using an electronic market as a supplementary channel is a good way to gain experience of the new market at low risk. By participating at some level, an organisation can encourage the market to develop in a way that complements existing markets and sales channels, rather than competing with them.

Suppliers can opt to compete fully in the electronic market

If a supplier decides to compete fully in an electronic market, he must adopt a strategy that makes his offering highly competitive. There are four principal strategies:

— *Compete on price*. Electronic markets place greater emphasis on price competition. The traditional strategy is to compete on price by concentrating on cost reduction. To succeed with this strategy, it is essential to take advantage of all potential gains in efficiency offered by developments in information technology.

— *Emphasise factors other than price* — for example, product specification, quality, speed of delivery, or other aspects of service. Although we said above that this tactic can be used as a way of staying out of the market, it can also form the basis for competing within the market: suppliers need to identify other factors that can be promoted effectively in the new environment. Some companies selling motor and household insurance to consumers in the UK market, which now makes extensive use of quotation systems, are promoting their speed of response when a claim has to be made.

— *Identify niches*. If the advent of an electronic market has expanded the geographical scope of the market, it may no longer be desirable, or indeed possible, to compete with a full range of products. Major European national banks, which are used to offering a full range of services in their own national markets, find that they have to specialise in today's international market. For smaller players, the identification of niches is particularly attractive. They can develop specialised skills that make them highly competitive. Moreover, within a small niche, there may be less competition, so that a reasonable share of the market is assured.

— *Compete on responsiveness*, by being better at tailoring an offer to the demands of the market. This tailoring needs to be conducted at two levels. First, an offer needs to be tailored on a 'static' level, fragmenting the offer and customising the products to the requirements of each subsegment of the market — ideally, to the requirements of each individual customer. At the second level, however, an offer needs to be tailored on a dynamic basis. This means responding not just to slow drifts and developments in the marketplace, but to small day-to-day fluctuations. In many cases, it means being prepared to respond to individual bids from customers, and to make ad hoc offers, rather than relying on fixed price schedules.

Such changes are radical, and by no means easy to implement. They need new ways of thinking, and new management tools. Important decisions concerning price must be pushed down the organisational hierarchy. If overall profitability and security are to be maintained, that requires extensive re-education, not merely traditional job training. Effective motivation mechanisms are needed to tie rewards to profitability, not to sales revenue. Above all, they require new, responsive forms of financial information on which to base such decisions, and new financial controls to keep the decision-making within predetermined boundaries.

Purchasers should review their trading relationships

Most organisations operate both as suppliers and purchasers, although the balance between the perceived importance of the two functions varies considerably. How can the purchasing function participate in electronic marketplaces to help the organisation as a whole respond to increasing business pressures? A review of overall purchasing strategy in the light of electronic markets needs to focus on trading relationships. It should result in closer relations with strategic suppliers, the promotion of more aggressive competition for spot purchases, and a re-assessment of the balance between strategic and spot purchasing.

The key issue with strategic suppliers is how the partnership can be made more effective in the marketplace. In re-evaluating its relationships with information technology vendors, the Midland Bank in the United Kingdom, for example, picked a handful of vendors with whom it sought a strategic relationship. These vendors are given privileged information concerning the bank's information technology plans. In return, they are expected to share risks — for example, by guaranteeing levels of performance for their systems.

The strategic review should also attempt to pinpoint areas of purchasing that are not of critical strategic importance to the company, but that have, nonetheless, been non-competitive for practical reasons, such as the cost of comparing several suppliers. Can any of these now be opened up to competition? Can more competition be introduced into purchasing that is already competitive by assessing a wider range of suppliers?

In some large decentralised organisations, subsidiaries trade competitively among themselves, sometimes in competition with outside suppliers. Where there is an internal market of this kind, organisations need to review their internal trading arrangements. The creation of an electronic market may greatly improve efficiency by improving the flow of information. In addition, where subsidiaries compete with external suppliers, it is particularly important to maximise the chances of meeting requirements internally, and to avoid giving third parties opportunities for arbitrage between subsidiaries. This can be done by setting up internal systems to keep subsidiaries fully informed of each other's requirements and offers.

All organisations should review the functions they perform internally

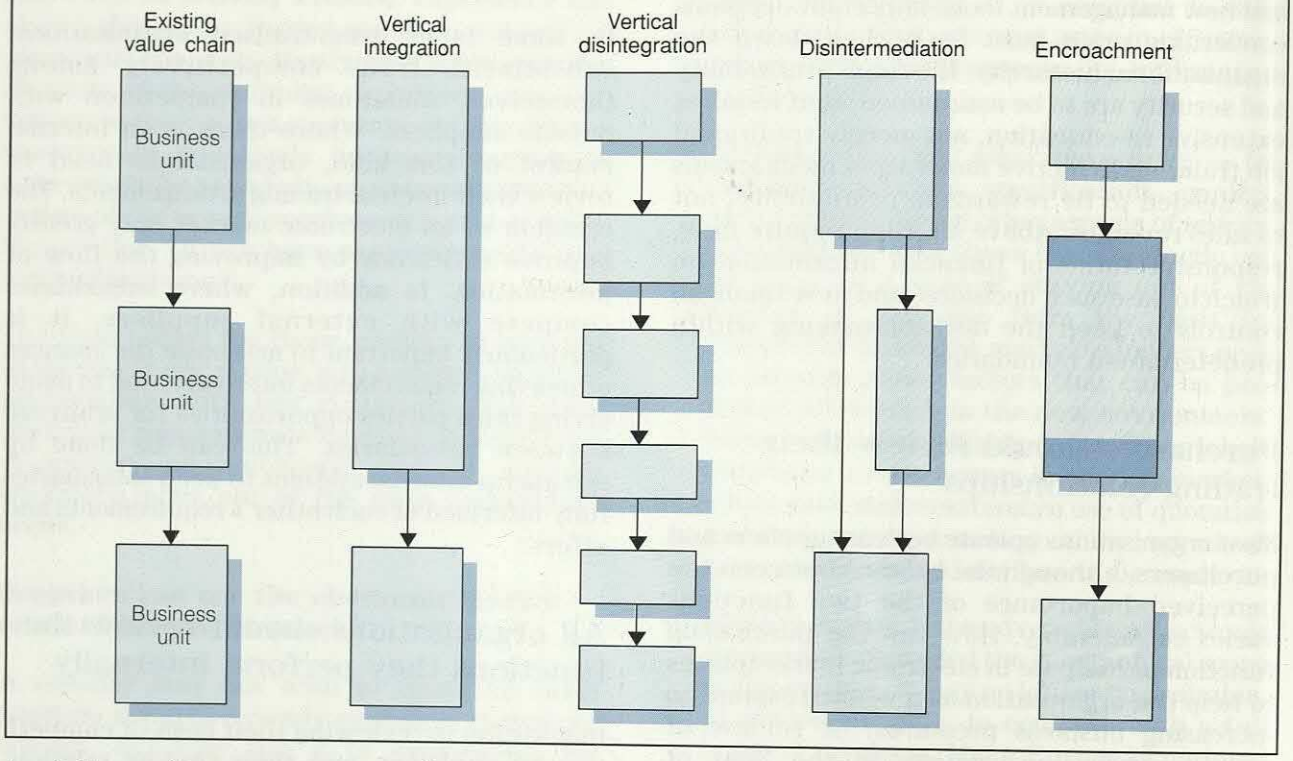
In addition to reviewing their basis of competition as suppliers, and their trading relationships as purchasers, organisations need to undertake a strategic review of the set of functions that they perform themselves. Figure 6.2, overleaf, illustrates some of the concepts, in terms of restructuring of the typical value chain, that electronic marketplaces make possible.

The case for vertical integration should be re-examined

Traditionally, companies have sought to maximise efficiency along the various stages of the value chain by vertical integration: if successive steps in the process of bringing a product or service to market are performed within the same organisation, coordination and control are more effective, output from the earlier stages is better assured, and economies can be achieved through forward planning without passing sensitive commercial information outside the company.

There are, however, counter-arguments to vertical integration. Larger organisations tend to have higher overheads, and cannot adapt quickly to changing market conditions. Smaller, separate organisations are more likely to be able

Figure 6.2 **Electronic marketplaces make new business strategies possible, based on the structure of the value chain**



to deliver the specialised managerial skills required at different steps in the value chain. Many organisations are therefore seeking to identify and concentrate on their core business, and to subcontract other activities. IBM and other major computer manufacturers are now concentrating on the design, assembly, testing, and shipping of computers, but are producing fewer of their own components. The design of most European car bodies is now subcontracted to just five specialist firms.

Electronic marketplaces challenge many of the arguments for vertical integration (at least, the pragmatic arguments — vertical integration is sometimes pursued more for psychological or emotional reasons), and thereby strengthen the case for vertical disintegration. Exchanging control information, such as forecasts for demand, via electronic channels like EDI, enables supplier-customer relationships to operate as tightly as subsidiaries of the same group. The electronic transmission of detailed specifications, including engineering drawings, can considerably reduce the overhead in both cost and time associated with sourcing components externally. The falling costs of electronic communication and processing permit the decentralisation of processes that previously had to be centralised — for example, the generation of insurance quotations. Indeed, it may in future pay to contract out a wide range of functions currently performed in-house.

The role of intermediaries should be re-examined

Vertical integration usually refers to an organisation acquiring suppliers or distributors in order to improve efficiency or to ensure continuity of supply. Vertical encroachment is a related, but quite distinct concept. It means encroaching on the territory of neighbouring organisations in the supply chain, with a view to competing with them directly. Electronic marketplaces provide new opportunities for vertical encroachment because they provide new ways to compete. Many of these opportunities will concern business intermediaries such as distributors, brokers, agents, and retailers. One consequence will be the growing practice of disintermediation — the name given to the process of eliminating or bypassing intermediaries.

Disintermediation is most likely to happen where the intermediary adds little value. If all

the intermediary offers is a knowledge of what is available in the marketplace, at a level that could be displayed on an electronic screen, together with the ability to accept orders, then the job can be done equally well by an electronic system. We believe this to be the case more often than is commonly imagined.

Disintermediation can be initiated either by suppliers or customers. Suppliers do it if they can find means of economically communicating directly with their customers, using telemarketing, or the combination of direct mail and geodemographic databases. Some services that have traditionally been sold through intermediaries — in particular, holidays and insurance — are now being sold direct to the public by conventional means. Typically, these direct-sale operations have achieved a significant but minority share of the market. Attempts to use information technology channels to sell direct to the public have mostly foundered on the lack of suitable terminal equipment in most homes, although the Prodigy home-shopping venture in the United States and some Minitel-based offerings in France have had some success.

Customers initiate the process when they perceive that they can eliminate unnecessary delays and misunderstandings, or if they can negotiate a better rate for dealing direct with a supplier. Purchasers in large organisations are the most likely to have access to the necessary technology and expertise and to have sufficiently large requirements to participate in a wholesale market and justify the initial investment. For example, large corporations in the United States can now access Sabre, the airline reservation network, to order tickets direct, without going through travel agents.

The worst situation for the intermediary is when neither the supplier nor the customer perceives the intermediary as adding any value. Such organisations must find a way of adding value quickly, or they will go to the wall. Better use of information is increasingly one of the keys to adding value.

It is naive to suggest that disintermediation will happen across the board. In many cases, intermediaries add real value. Many distributors of physical products also take responsibility for their delivery and for after-sales service or maintenance. The roles of other intermediaries, notably in the financial sector, are preserved by regulation.

Intermediaries will, of course, fight back against new services that threaten to put them out of business, typically by putting pressure on suppliers who support the new service. Furthermore, current business processes and relationships depend on the role of the intermediaries, and change may entail a level of disruption that is unwelcome to all concerned.

In some cases, electronic markets allow intermediaries to encroach on suppliers' territory, so that electronic marketplaces can actually strengthen the hand of certain intermediaries. The clearest example of this is in the retail sector, and especially in food retailing. Today's electronic point-of-sale (EPOS) systems have transformed the quality of the information available to major retailers about their sales. Prior to EPOS, the manufacturers supplying them had equally good market information, based on the orders they received — in particular, where salesmen took orders from individual stores.

EPOS has radically changed the balance of power. One large retailer expressed it to us like this: "We have already taken the function of distribution away from our suppliers — they now supply to a single distribution point. We are starting to take the marketing off them. We don't, for example, allow any in-store promotion by our suppliers, and we increasingly dictate the specification, pricing, and packaging of their new products. By the time we've finished, all they will be left with is the manufacturing."

Foundation members who represent intermediary functions or who employ intermediaries need to take a long hard look at opportunities for encroachment afforded by electronic marketplaces, both in their favour and against them.

Companies should identify new business opportunities

In addition to providing new ways to compete within existing markets, and new ways to encroach on the territory of others, electronic marketplaces create completely new business

opportunities. These can be described as 'service station' opportunities: just as the building of a new highway creates a business opportunity for service stations, so the establishment of new electronic data highways creates equivalent opportunities.

The nature of the opportunities will vary from sector to sector. However, the following four types of new business opportunities apply to a wide range of sectors:

- *Market making*. Setting up and running an electronic market is itself a business opportunity. A wide range of organisations have set up such operations, including product and service suppliers, intermediaries, software houses, third-party network service suppliers, public-sector bodies, and existing market makers such as stock markets.
- *Market research and statistics*. Electronic marketplace developments usually involve the capture of more and higher-quality data than were previously available. In addition, where trading takes place electronically, data can be aggregated to generate market statistics. Data from both these sources can be sold as a service in its own right.
- *Derivative products*. The increase in geographical scope that has resulted from moves to electronic markets brings greater trading volumes, which in turn generate the volume that is needed for markets in derivative products, such as options and futures, to be viable. The transparency of electronic markets and the ease with which information about competing offerings can be obtained and compared is also said to encourage a more sophisticated and analytical approach among customers, and to increase demand for sophisticated products. Finally, when data on markets and holdings is available in electronic form for rapid calculation, more complex products become manageable, and therefore more attractive to customers. All these factors promote new opportunities for derivative products.
- *Information-technology-related services*. The new electronic information and trading media require new skills and services for their delivery — for example, software development, specialised editing and design appropriate to on-screen presentation, and systems support and maintenance.

In this chapter, we have demonstrated the need for individual organisations to conduct a strategic review in the light of the threats and opportunities created by electronic marketplaces. In the next chapter, we turn to the role of the systems department, and examine the ways that it can either help or hinder the organisation in its response to electronic marketplaces.

Chapter 7

Implications for the systems department

In the preceding chapters, we have shown the importance of systems in enabling organisations to compete in the electronic marketplace. Here, we review the role of the systems department, and the actions that it should be taking to help implement an appropriate business strategy.

The systems department cannot lead the organisation into the electronic marketplace. Neither can the systems department afford to lag behind the business. One frustrated marketing manager described how his company's systems department had not been able to meet his requirements for a marketing database. Its attitude was that if it could not deliver his requirements, the requirements should be changed. The marketing manager went to an outside supplier; the database was implemented on an external bureau, and transferred back in-house to be managed by the marketing department directly.

The role of the systems department will depend upon the extent to which the organisation has already formulated a strategy towards electronic marketplaces. In a few cases (American Airlines is the obvious example), the board has already made a major commitment to electronic marketplaces. The systems department then has the remit, and the budget, to invest heavily in the infrastructure needed, both for now and for the future.

For the majority of organisations, however, the board has made no such commitment, and in such cases, systems departments need to tread carefully. Operating on its own, the systems department can and should promote the development of an infrastructure to compete in electronic marketplaces. However, to ease the implementation of substantive new applications, and thereby help the business to gain the most from the potential of electronic marketplaces, the systems department should seek to form a strategic partnership with the marketing or purchasing department. Once the commitment to developing electronic marketplace applications has been made, the systems department needs to deploy new approaches to systems implementation.

The systems department should promote the development of an infrastructure to compete in electronic marketplaces

Where the systems department has not already been given a clear remit to implement electronic marketplace applications, it should promote the development of an infrastructure that will facilitate such applications when the decision is taken. Such development needs to be promoted on two fronts — educating the business and reviewing existing systems.

Educating the business

The systems department has a responsibility to educate the rest of the business not only about what applications its competitors are introducing, but also about what applications will become possible in the near future. This means monitoring emerging technologies, such as multimedia and forthcoming telecommunications services such as ISDN and 900 numbers (where the cost of information provided is added onto the telephone bill), identifying the implications for the business, and drawing on that information to help individual departments.

It also needs to monitor the development of marketplace standards. Systems departments are used to monitoring standards issues, but primarily in terms of the battle between proprietary and open standards for the systems that they use. They should now start to monitor

market standards. What technical standards for networks, EDI messages, or databases are being adopted in the same market sector by their customers, their suppliers, and even their competitors? Where possible, the systems department should adopt and promote these standards internally, even where no commitment to external trading has yet been made.

Ensuring that current systems can support electronic marketplaces

The systems department should use its best endeavours to ensure that current systems, and certainly all new systems that it develops, are well placed to support electronic marketplaces in the future. This means starting with a review of existing internal systems and, where appropriate, evaluating their potential to be extended outside the organisation. Any problems in upgrading them to the appropriate levels of performance need to be identified. One large conglomerate we interviewed had delayed implementing EDI on its purchasing systems for nearly a year because the EDI module promised by the supplier of the purchasing software used by many of its constituent companies failed to materialise. In other cases, where online transaction modules were required, the database could not handle external online contact at the same time as internal access.

Following such a review, the systems department needs to adopt a 'market facing' philosophy with regard to new systems development, and promote this philosophy aggressively. Four concepts are crucial to this philosophy — interworking, responsiveness, security, and robustness.

Interworking

Systems departments need to pay increasingly close attention to the ability of internal systems to interwork with each other, and eventually with external systems. In particular, they should:

- Promote the rationalisation and integration of systems within individual departments. Non-compatible departmental systems can be a major disadvantage in establishing communications between departments or with the outside world.
- Establish standards to ensure that departmental systems can intercommunicate.
- Ensure that systems have clear external interfaces and that they can support external communications standards.

Organisations that have to interwork online with several other organisations may find that they need to support several sets of standards. If the differences relate only to message-format standards, the overhead may be limited to additional front-end translation software modules. Where different standards reflect different business processes, the solution may have to be significantly more complex. One major aerospace company undertaking both civilian and military contracts has to work to three different sets of standards, relating to different terms of business. The company is not organised on the basis of a separate group for each type of business, and any part of the business may find itself working in all three standards domains in any one day. The company has responded to this situation by isolating processing from communications in its systems. It has core company systems, which work to internal standards, and which interface to systems that are specific to each standards domain.

Responsiveness

The need to respond rapidly to customers, perhaps in situations where the organisation has to interact with its suppliers, or where several internal departments have to be involved, often highlights shortcomings in internal systems. Some internal systems delay responses to an extent that is unacceptable in the new environment — payment systems are often particularly at fault in this respect. In other cases, interactions between systems across the organisation have the same effect.

The systems department should review the adequacy of internal systems to support rapid response across the organisation. It should also review the ability of internal systems to support a vastly increased volume of external communication.

Security

Access to company systems by users in other organisations inevitably brings increased security risks, and security provisions will need to be re-assessed accordingly. The recommended approach is to undertake a risk analysis to identify potential threats and their

consequences before starting system design, so that security requirements can be specified. (Report 76, *Systems Security*, provides guidance in this area.)

Development of a customer database may pose a new risk — for example, by making it possible for employees leaving an organisation to poach its customers. The managing director of one large services company refuses to consider implementing a customer database on exactly this premise. The current manual system is sufficiently distributed to make it very difficult for any manager to access the complete customer list. Yet, when it is bidding for new business, the company is not able to find out how much business it does with other companies in the same group, for example. The systems department needs to be able to demonstrate that the customer database really can be made secure.

Robustness

Where companies transact a significant amount of business over electronic links, particularly in fast-moving markets such as many financial markets, they depend on the reliability of the links to continue to do business. This requires a far more rigorous approach to the robustness of communications systems than has been common practice to date. Organisations should, for example, consider duplicating communication equipment and providing at least two independent routes for essential communications links.

The systems department should seek a strategic partnership with marketing or purchasing

The best way in which a systems department can help its organisation to capitalise on the potential of electronic marketplaces is by seeking to form a strategic partnership with the marketing or the purchasing department. Whether it is the marketing or the purchasing department (or, indeed, some other department such as trading, merchandising, or distribution) will depend on which of the functions is most critical to the competitiveness of the business.

A strategic partnership exists where both parties recognise their interdependence (or potential interdependence) in the process of achieving a mutually desirable objective. Each party contributes something different, and receives a different benefit, but treats the other as an equal. Such a partnership can be contrasted with a transactional relationship, in which each party seeks only to use the other to achieve its own ends.

A strategic partnership will help to ensure that the key decision makers understand the strategic importance of information technology. It is also needed in order to justify the costs of developing major electronic marketplace systems, which can be large compared with many purely internal systems. Moreover, major systems, such as customer databases, need to be treated as corporate assets: bickering between the marketing department and the systems department over ownership of the database will only hinder its development and application.

A strategic partnership requires close co-operation and understanding. In particular, it entails mutual participation in the strategic and long-term planning of the other department. The systems department may welcome the prospect of being admitted to the most intimate considerations of marketing strategy; the idea that marketing would have an equal say in formulating the systems strategy may be less comfortable, but is a necessary corollary. It also implies a measure of equality. When asked to list the benefits to the systems department of one supposedly strategic partnership, the marketing director replied: ''Well, they get to keep their jobs, don't they?'' That is not a strategic partnership. It follows that the systems department cannot attempt to establish a strategic partnership with all its user departments — the extent of commitment required would make that impracticable.

A strategic partnership with the marketing department implies a significantly greater degree of understanding of marketing and its priorities by systems staff than is often the case. The systems director needs to ensure that the requisite skills are available in his department. In Report 71, *Staffing the Systems Function*, we drew attention to the need for the systems department to develop staff with good business and interpersonal skills, as well as technical skills. Such staff are particularly important in liaising with marketing and purchasing

departments: some systems departments have found it necessary to bring in staff with marketing backgrounds to perform these tasks.

Electronic marketplace applications require a new approach to systems implementation

Once the organisation has made a commitment to the development of electronic marketplace applications, the systems department should concentrate on acquiring the new skills and approaches that such applications will demand. We describe here some of the capabilities required.

Marketing applications require rapid approximate analyses

All user departments complain about delivery times on new applications. However, a delay in the delivery of a new warehousing or accounting system probably results, at worst, in a commensurate delay in cost savings. A delay in a marketing application may result in the loss of a window of opportunity.

Marketing needs to be able to test out a wide range of hypotheses about the marketplace quickly and cheaply. Moreover, it is not always possible to predict, in advance, the kinds of analyses that will need to be undertaken. It follows that marketing needs very flexible data analysis tools, and that user requirements for marketing analysis systems change rapidly. The other side of the coin is that marketing requirements are usually satisfied by relatively approximate outputs from the analysis — an idea that would be an anathema to the finance department.

While many of the analyses that need to be undertaken will be relatively simple, some will require modelling or artificial intelligence techniques. Often, data will need to be drawn from external sources, such as market research or geodemographic databases, and combined with in-house data.

A critical issue is deciding who should conduct the analysis: should it be systems staff, marketing staff, or perhaps market research specialists? G E Capital, whose experience was described in Figure 2.4, found that none of these three sources could provide the skills needed to get the most from its customer database. It brought in external operations-research specialists, and provided them with marketing training.

A new approach is needed to preserving information for future use

There is no point in an organisation's basing market analyses on some non-representative subset of the customers for which it happens to hold data, such as those that had to return their equipment for repair. As far as is practicable, the marketing database should therefore contain all marketing and sales information likely to be of use in future. This approach is in marked contrast to that employed for most financial systems, where only the data specifically required for a small set of pre-specified types of analysis is kept. Companies should be prepared to hold marketing information for 12 to 24 months, or in some cases, considerably longer, as a basis for historic analyses.

Nor is it possible to anticipate all the types of questions that will be asked of a marketing database over its lifetime. It should therefore provide for flexibility of access. Relational database technology is more appropriate than hierarchical. Indeed, several companies we spoke to directly attributed the success of their customer database to their selection of a powerful database package. Those who are just starting to consider the implementation of a marketing database should also seriously evaluate new technologies such as database machines, which offer considerable performance advantages for manipulating large database systems.

User interfaces assume greater importance

The design of the user interface assumes greater importance when users belong to different organisations. There is less opportunity to train them or motivate them to use a particular interface than if they are in one organisation. Moreover, users may choose between competing systems on the basis of which is the easiest to use; the design of the user interface therefore becomes a crucial weapon in the battle for competitive advantage. A good example of a

situation of this kind is the competition between insurance companies in the services they provide to insurance brokers in the United Kingdom.

User support may need to extend outside the organisation

Providing online connections to large numbers of other organisations may raise major problems of user support. The organisations connected may not have the resources or the expertise to implement the connection, train their users to employ it, resolve any queries that arise during the course of operation, or maintain the systems on their premises. By default, the responsibility for providing these services at many widely scattered, remote locations may fall to the organisation providing the connections.

Many organisations faced with this dilemma turn to third-party service organisations to resolve the problem, in addition to other aspects of network service provision. Those that decide to provide the support themselves may need to supplement their skills in systems from vendors they do not use themselves — for example, an IBM shop may need to connect to Digital systems in other organisations.

Systems must facilitate the development of new products

The service content and the information content of a wide range of products is growing, both in size and importance. New products and services increasingly make new demands on companies' information systems, particularly in the financial sector, where new information-based products (such as bank accounts that vary the interest rate with the balance) are becoming the basis of competition.

If the systems department is to work closely with the marketing department, it needs to facilitate rapid new product development of this form. This means both providing appropriate tools, and keeping the marketing department advised of the ways in which new information technologies might have an impact on the product range. Above all, it must ensure that company systems are sufficiently flexible to enable new products to be implemented quickly.

Report conclusion

The development of electronic marketplaces will change the basis of competition in many business sectors, open markets up to new competitors, and change the relationships between participants. Companies that rely on inefficiencies in the existing market, risk going out of business. Electronic marketplaces will, however, generate many new opportunities in existing markets. They will also open up new markets where none previously existed.

Foundation members should prepare their organisations for these developments. They should adopt a competitive strategy appropriate to the new environment, grasp new opportunities to increase the effectiveness of their purchasing, and re-assess the set of functions that they perform internally. Above all, they should ensure that they have the systems infrastructure required to exploit the potential of electronic marketplaces.

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