

# 5

## IS/IT Strategic Analysis: Determining the Future Potential

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The techniques of assessment discussed so far enable the current role that IS/IT is—or should be—playing in the business to be analysed, both critically and constructively. It is always important to understand where you are—a situation appraisal of the systems that exist and how well they support and enhance operational performance, management control and the ongoing development of the business. A key aspect of this assessment is to what extent these systems enable the separate activities and functions of the business to perform harmoniously. This implies an understanding of the information-based relationships of the business, both internal and external, as well as information processing requirements. Often, this analysis reveals areas of systems deficiency, obsolescence, ineffective linkages and poor utilization of existing information. Dealing with the critical inadequacies—ensuring IS/IT is not hindering current business performance and is not a potential or real source of competitive disadvantage—is a key part of the strategy development process.

Directing resources and actions toward areas that will affect the achievement of future, known business objectives is then the next step in developing the strategy. The use of a combination of ‘Balanced Scorecards’ (BSCs) and ‘critical success factors’ (CSFs) are an effective way of achieving the appropriate focus of management attention. They are designed to put IS/IT onto the management agenda, to ensure IS/IT strategy and plans are in alignment with organizational intentions and management’s priorities for a given period. This probably implies within the objective setting horizon of one to two years.

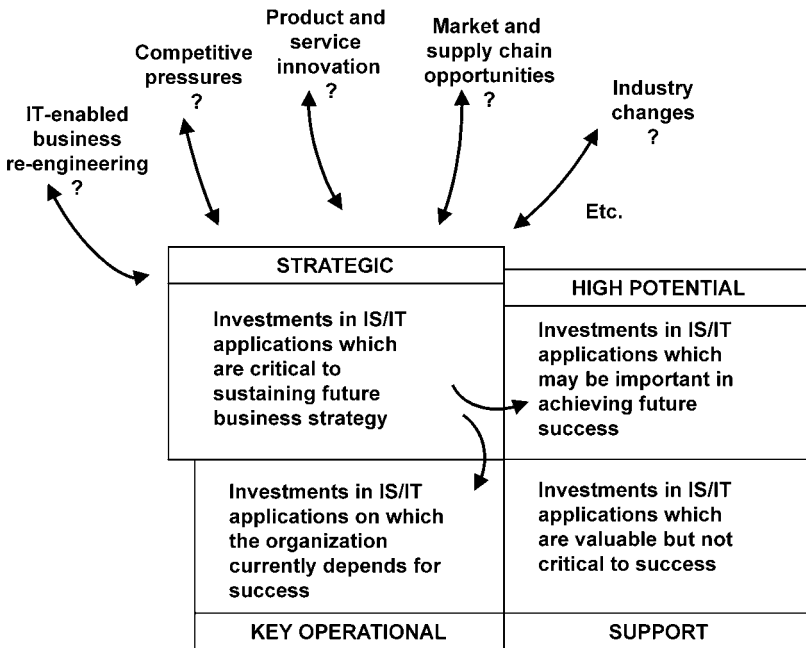
Therefore, these are analytical techniques that enable the effective support of the current or intended strategy from IS/IT developments.

However, as described in Chapters 1 and 2, adept investment and deployment of IS/IT can enable new strategic options to be developed, thus shaping the strategy of the business. Equally, changes elsewhere in the industry, caused by IS/IT investments by customers, competitors and suppliers may affect the organization's intended strategy. Hence, the potential opportunities and threats from IS/IT and its ability to change industry dynamics and relationships must be addressed. This assessment of new IS/IT application areas requires a degree of creative thinking as well as analysis of business options, to determine the potential impact of IS/IT on the business.

The analytical techniques that have been described so far are not sufficient to carry out such an 'impact analysis', neither do they easily express the options and issues in terms familiar to line managers. The tools and techniques of strategic thinking and analysis frequently used in business strategy formulation offer another approach, which will be more easily adopted by business line managers, whose commitment is critical to converting good ideas to actual strategic uses of IS/IT. Many of these were described in Chapter 2, where the IS/IT strategy implications were also discussed. The techniques described in this chapter offer a more focused brainstorming or creative analysis approach, and help to forge a coherent link between the business strategic issues and options and the rationale for the nature and purpose of future IS/IT investments. They are undoubtedly not an exhaustive coverage of all that could be used, but they are those that have often been successfully adopted in assessing the potential future impact of IS/IT on many industries and on many businesses.

One problem with a 'tool kit' approach is deciding which tool to use and when. It is always convenient to have a methodology that clearly indicates which tool to apply when, what result to expect and what to do next if you get (i) the right result or (ii) the wrong result! Unfortunately, such a clear definition of an IS/IT strategy development process is not, and probably never will be, possible. Many writers over the last 20 years have described the application of many of the techniques introduced in this chapter, and most agree that a prescribed methodology is not appropriate, concluding that what is required is a tool kit. Neumann<sup>1</sup> describes essentially the same set of techniques, but refers to them as 'frameworks for strategic information systems'. He recognizes that they are a means of helping the thinking process, not a recipe for ensuring the identification of strategic systems. More recently, in the context of 'e' opportunities, Feeny<sup>2</sup> and Timmers<sup>3</sup> suggest a similar set of techniques within an overall logic for their application.

Although no methodology can be proposed, in Chapter 6 each of the tools will be considered as part of a process that can be adopted for



**Figure 5.1** *Developing the application portfolio from a strategic perspective*

developing IS/IT strategies, within the overall context described in Chapter 3. In terms of the application portfolio, the focus of this part of the assessment is primarily to identify strategic investments (see Figure 5.1). However, the approaches may also suggest high-potential possibilities that need further investigation, before their contribution can be decided. They may also identify whether existing or planned key operational systems either provide a good basis for exploitation or could be a constraint to future business options provided through IS/IT.

## ALIGNING THE IS/IT INVESTMENT STRATEGY TO THE BUSINESS

Development of business strategies can be carried out in a variety of ways, but, as discussed in Chapters 2 and 3, this is probably most effective if the organization is considered as a group of (strategic) business units. This enables the market/product relationship to determine strategic thinking and functional/organizational aspects become secondary,

ensuring that external strategy drives internal strategy rather than vice versa. Within a business unit, the portfolio of products and/or customers can be analysed to identify how each grouping contributes to or makes demands on resources available.

The business unit is also the level at which the analysis of competitive forces provides the sharpest focus and for which the generic strategy concepts best apply—low cost, differentiation, niche—since it is both possible and essential to develop and operate a coherent set of consistent behaviours for a business unit. Low-cost versus differentiation conflicts within a business unit will cause confusion and suboptimal or even contrary decisions to be reached. But, within a corporation, two business units operating in two different environments might adopt low-cost and differentiation strategies, yet still trade internally with each other.

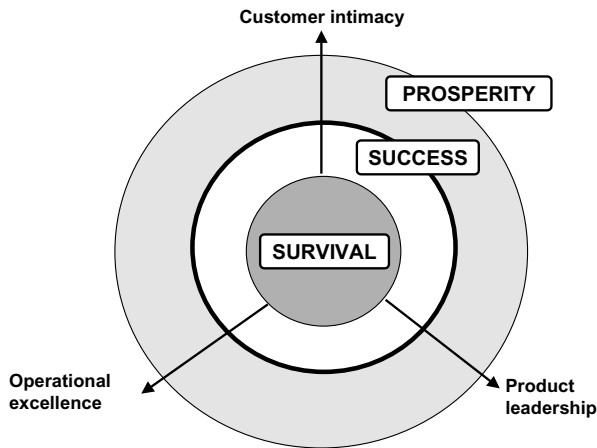
For these reasons alone, it is important that IS/IT strategic analysis should align itself to the business unit approach. Quite different business attitudes to investment, including investment in IS/IT, are likely to prevail in units following differentiation or low-cost strategies, and the opportunities for strategic IS investments are unlikely to be the same. Applications for similar business functions like order processing could well be very different in practice due to the different relationships with customers that the two generic strategies imply. Units operating in niche markets will have different opportunities for exploiting IS/IT options from those serving a wide range of market sections, especially with customers and suppliers.

As discussed in Chapter 1, the most significant difference in the SIS era is the external focus of systems. Organizations have adopted the strategic business unit (SBU) approach to business planning, in part to achieve the more effective strategic decision making implied in Phase 3 of approaches to strategic management discussed in Chapter 2 (see Figure 2.1) (i.e. more effective, externally orientated, planning), based on:

- situation analysis and competitive assessments;
- evaluation of strategic options;
- dynamic allocation of resources.

This would include an assessment of the role of IS/IT in terms of its use in the industry, by competitors, suppliers and customers, as well as the effectiveness of its use within the business unit.

Chapter 2 described how, using these techniques, it is possible to interpret the results in terms of high-level implications and priorities for IS/IT investment for a business unit, or enable pertinent questions about IS/IT opportunities or threats to be included in the business



**Figure 5.2** Advantage and disadvantage—dimensions of competency (source: after M. Treacy and F. Wiersma, *The Discipline of Market Leaders: Choose Your Customers, Narrow Your Focus, Dominate Your Market*, HarperCollins, London, 1995)

strategic analysis (see, e.g. Figure 2.8 and the discussion on pages 95–100).

Determination of priority IS/IT investments also depends on the chosen ‘value discipline’, as per Treacy and Wiersma,<sup>4</sup> for achieving advantage *and* the relative strength of the organization in the other disciplines (i.e. Operational Excellence, Customer Intimacy and Product Leadership). Figure 5.2 portrays levels of relative competence of the organization along each of the axes—survival, success and prosperity. The last of these implies that, if the organization is beyond the ‘success’ line in at least one competency and equal to competitors in the other(s), it should deliver above-average profits in the industry. However, if any of the competencies are within the ‘success’ circle, any potential advantage is likely to be offset by poor performance elsewhere.

For example, a bank that had developed a new and excellent mortgage product for younger people (as defined by independent benchmarks) and had as good customer relationships as any other bank (again via independent surveys), could not understand why sales were so poor. The reason was the slowness and unreliability of the mortgage application process, which used a much older system designed for an earlier generation of products. The process could not deliver the ‘service promise’

inherent in the product and, given the target customer group, many customers went elsewhere to obtain an inferior product, faster.

This is just one example of how the competency analysis can help identify how priority IS investments are essential to avoid competitive disadvantages. Where the organization is outside the success line (i.e. is outperforming most others in one dimension), more creative thinking is needed to identify how IS/IT can be used to develop the competency further and sustain the advantage. For example, having established 'personal' relationships with its book-buying customers, Amazon.com is able to analyse purchase patterns and identify other books of potential interest to an individual customer—a far more valued service than sending a general catalogue, either by post or electronically.

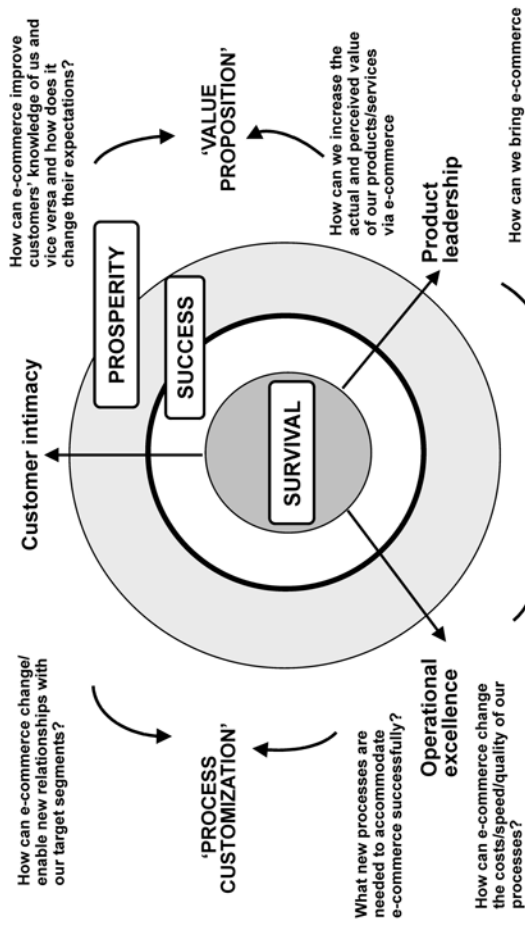
Some suggested questions, of particular relevance to the electronic commerce dimensions of the strategy, have been overlaid on the basic model in Figure 5.3. They attempt to show how generic e-commerce options—improving the value proposition, mass customization, performance improvements and cost reductions—require combinations to be addressed.

As stated in Chapter 2, this technique proves very valuable in gaining agreement among managers about what has to improve and why, and, especially, whether the purpose is to gain advantage or avoid disadvantage. It helps integrate the 'themes' inherent in the business and IS strategies and focus resources on medium-term IS priorities.

Although the relationship will not always be perfect, the changing content of the application portfolio should reflect the evolving strategic themes. Applying these ideas in a number of organizational situations, they have proved very useful in clarifying the business rationale for IS/IT investment plans. Generally speaking:

- Strategic applications should relate readily to the dimension in which the organization seeks to excel in the next one to three years (i.e. product leadership, customer intimacy or operational excellence), with the objectives of gaining advantage in the marketplace.
- Key operational application improvements are essential in any dimension if the systems are causing performance levels to fall below those essential to success (i.e. are causing disadvantage).
- High-potential projects would normally be 'prototypes' related to specific strategic developments or evaluations of ideas relevant to the other dimensions (i.e. early, tentative steps in finding out how IS/IT might provide future opportunities once the current focus of the strategy changes).

Over a period of time, an organization might pursue all three of these



**Figure 5.3** E-commerce and the dimensions of competence

directions. It will probably have to change if it is to maintain a leadership position in response to the actions of competitors. But, it is extremely difficult to ‘major’ in more than one at once, and any indecision will cause ever-changing priorities, inconsistency and even confusion within the business—a recipe for failure with IS/IT investments.

Analysis of the business situation, from both external and internal perspectives, is essential to establish the context within which opportunities can be identified and assessed. The techniques described below need to be used following an assessment of the business environment and with an agreed purpose, based on the priority ‘themes’ for improving performance through IS/IT. Otherwise, the assessment can become an unfocused exercise in which interesting options are identified, but without a natural and coherent link to the overall future intentions and direction of the business. As such, they will not be seen and treated as priority or strategic business investments.

## VALUE CHAIN ANALYSIS

The concept of Value Chain Analysis is described at length by Michael Porter<sup>5</sup> who notes that: *‘Every firm is a collection of activities that are performed to design, produce, market, deliver and support its products or services. All these activities can be represented using a value chain. Value chains can only be understood in the context of the business unit.’*

Equally, the value chain of the business unit is only one part of a larger set of value-adding activities in an industry—the *industry value chain* or *value system*. The value chain of any firm therefore needs to be understood as part of the larger ‘system’ of related value chains—those of its suppliers, customers and competitors, before it can be optimized. The actions of those other parties will have a significant impact on what the firm does and how it does it. This is especially true in the area of information systems. For example, the considerable investment made by food retailers in Point-of-Sale (POS) systems has changed the way information is passed to food manufacturers and has dramatically changed the delivery service required from those manufacturers. This has implications for the information systems within the food-processing companies and, in turn, the systems that relate to their suppliers. For an organization to identify the overall implications of e-commerce for its business in terms of opportunities and threats, the information flowing through the industry—the *external value chain*—needs to be analysed before the information processes can be optimized inside the business—by considering the *internal value chain*.



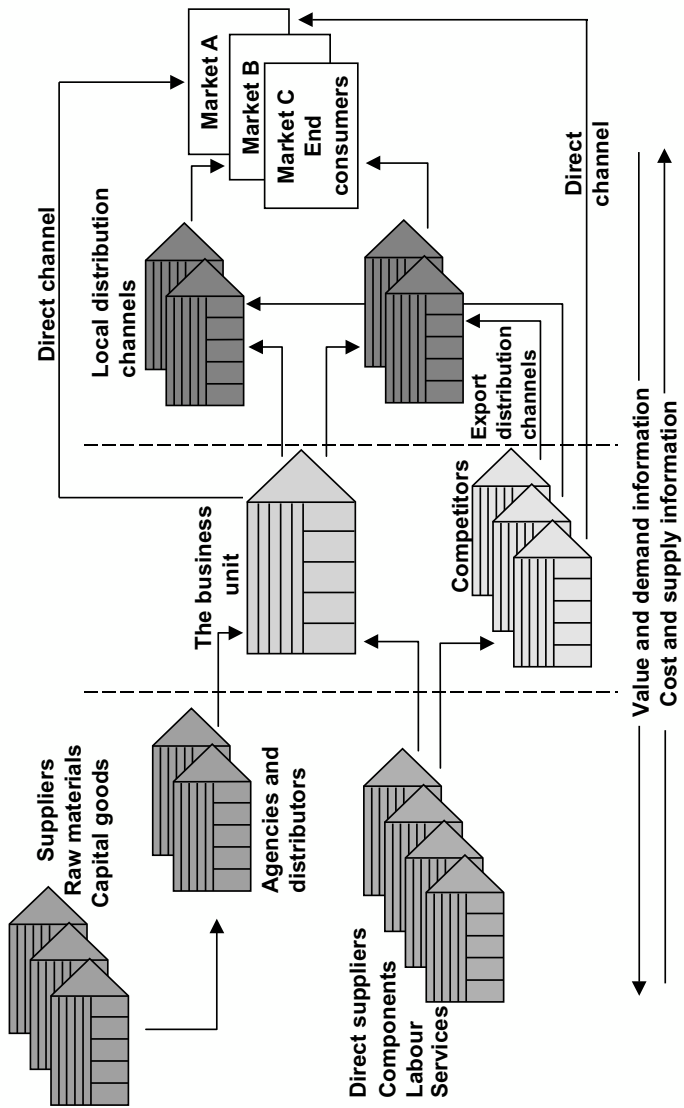
## **THE EXTERNAL VALUE CHAIN (INDUSTRY VALUE CHAIN OR VALUE SYSTEM)**

Figure 5.4 gives a schematic view of an industry value system. In particular, it emphasizes the key roles information plays throughout the chain. The overall performance of the industry, in terms of its ability to maximize its value-added and minimize its costs, is primarily dependent on how well demand and supply information are matched at all stages of the industry. To achieve the highest possible income and profit from the consumption of goods or services produced by the industry, the resources of the industry need to be focused on the value-adding activities involved, by producing those goods and services as efficiently as possible to the satisfaction of the consumers. If poor information means that those resources are wasted or used inefficiently, costs rise without increases in revenue, and overall profitability falls. In such situations, all that firms can do to improve profit is compete with their suppliers and customers to share out the limited available net profit. This almost inevitably leads to some firms going ‘bust’, the equilibrium is destroyed and the industry has to be reorganized in some way. It is not always the least efficient that suffer, it is often those with the poorest information about what is happening in the industry who go to the wall.

While the above discussion is primarily about ‘profit’, the value chain approach can be used in any industry, since every industry uses funds, incurs cost and uses resources to deliver services of some sort to consumers. In ‘non-profit’ industries such as government, health care and charities, there is always a matching of supply and demand to achieve a break-even, if not a profit.

The type of industry value chain model depicted above is appropriate for ‘traditional’ manufactured goods. Alternative models are considered on pages 265–268 that represent service-based industries. However, the following general issues apply to all the models.

Obviously, if an organization can match the demand for its products and services very closely to the supply of resources at all times, performance can be optimized and efficiencies maximized. Equally obviously, if the firm, ‘the business unit’ in Figure 5.4, is operating at some distance from the ultimate consumer and primary suppliers, it is difficult to obtain precise demand and supply information. Interestingly, we would expect organizations that have component businesses in different parts of the same industry value chain to be able to exploit their combined information to outperform others who cover less of the chain. In fact, that is often not the case, especially when the businesses operate as profit centres—the ‘internal competition’ that produces often means they actually cooperate less well than independent firms in sharing information!



**Figure 5.4** The external value chain

When starting to understand how industry information flows affect the firm itself, the firm should be treated as a 'black box' (i.e. how things are done inside the firm should be ignored—that will be considered later when looking at the internal value chain). The consideration should start at the end-consumers in terms of what information is available about the consumers' needs, who they are, etc. and how they can be influenced.<sup>6</sup> Then, the needs for information exchange with more immediate customers can be examined in terms of how effective it is for both parties. Eventually, all the flows of information to and from the firm downstream in relation to the consumers and intermediaries can be understood, in terms of critical information the firm needs and the current and potential sources of that information. The same process can be repeated in terms of immediate suppliers and their suppliers of key resources, raw materials and services.

Then, each of the key information flows can be examined to see how the process could possibly be improved in terms of accuracy, speed, cost or timeliness and how that might benefit the business. It might be, for instance, beneficial if a distributor could provide raw sales data directly, rather than consolidate their sales in order to place larger orders. This may enable the firm to give that distributor a more reactive service, allowing the distributor to hold lower stocks, yet satisfy more of its customers. At the other end of the chain, it may be possible to do similar things with suppliers and, while these are simple examples, they form the basis of 're-engineering' the way the industry operates to everyone's benefit.

It may be, of course, that many of the information exchanges cannot easily be improved, or cannot be improved without the willing cooperation of trading partners. Cooperation may only be forthcoming if there is some mutual benefit in changing that particular information flow or by changing another flow to provide the partner with a balancing benefit. It could be that, to produce the improvement, existing trading partners have to be bypassed and information exchanged with other parties further upstream or downstream in the chain. This may eventually lead to significant realignment of business relationships.

It is important to understand the type of 'value' and 'cost' added by each firm or process in the chain (i.e. what is different between the outputs and inputs); for example, a financial broker provides more choice to a customer than one insurer, but takes a % commission from the insurers on sales. Each key process in the chain should be assessed from two viewpoints:

- (a) How does it add value to the (next) customer in the chain?
- (b) How does it add value to those providing the input?

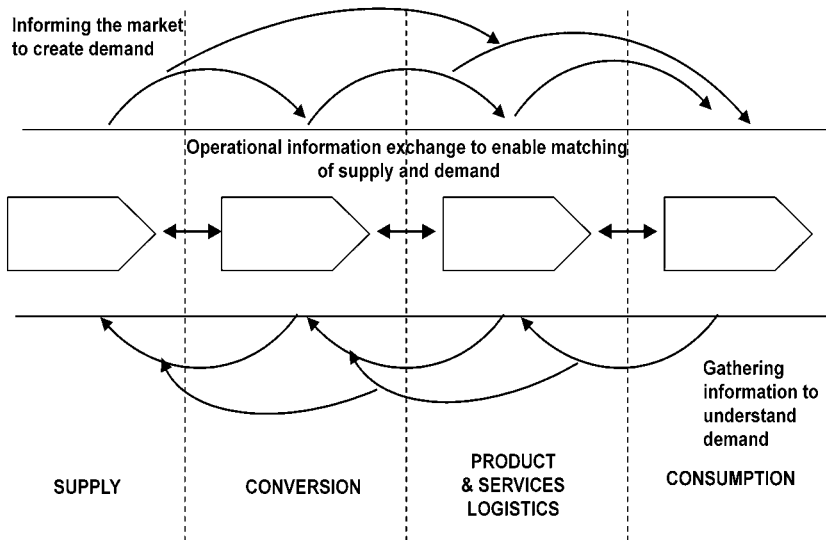
A retailer adds value to the customer mainly through the range of goods offered and local access to them, and adds value to the supplier by providing consumer availability, sharing stock costs and administration of low-value transactions, etc. When assessing changes to the chain, it implies that new value can be added, or existing value-adding and costs will be redistributed, or costs of adding the same value can be reduced, enabling price reduction or increased profit. In Internet shopping, the consumer's (invisible) costs are reduced, but costs are switched to home delivery. Unless this is offset by another cost reduction (e.g. lower stock holdings), the increased cost of supply will require an equivalent increase in price (payment for delivery)—or the profit in the chain will be reduced. These are relatively simple and obvious examples, but it is necessary to understand the overall chain economics and utility if changes are to be successful.

Many options will usually present themselves from the analysis, only some of which will prove feasible and beneficial to implement, at least in the short term. However, an understanding of the complete picture may lead to further options emerging in the longer term. It will certainly enable the organization to understand the implications of potential actions by others and then determine a more strategic response.

## **INFORMATION SYSTEMS AND THE VALUE CHAIN**

Obviously, business performance is dependent on the processes that gather and disseminate information. Links can be developed to various levels of sophistication and mutual dependence. Figure 5.5 shows three types of relationship. Normal business transactions (invoices, orders, payments, etc.) could be addressed by a company with most of its customers and suppliers who have computers, simply by connection via the Internet. This has indeed already happened in some industries, especially those dominated by large retailers, where the majority of basic business transactions with suppliers are now electronic. This basic use of e-commerce is spreading through different industries at varying rates. It not only improves the economics of transaction processing but also enables the whole chain to respond more effectively to real-time demand and supply changes—provided transaction information is shared.

Figure 5.5, based on work by Rayport and Sviokla,<sup>7</sup> considers two further types of value chain information flow that are being challenged by e-commerce. First, the implications of the promotional flow of information, which informs customers further down the chain of the products and services available, have to be understood. E-commerce offers an



**Figure 5.5** Understanding the information issues in the value chain (source: after Rayport and Sviokla)

additional channel for this flow, but also provides customers with the ability to search the whole chain for information directly or via intermediaries, on whom firms become increasingly dependent to provide an electronic shop window/shelf space for their products and services. Demand from the end-consumer may well change more rapidly than in the past, given the combined e-commerce attributes of effective 'promotion' linked to the immediate ability to transact business.

Second, e-commerce offers huge potential to gather information and intelligence about consumer and customer preferences and attitudes online, rather than through traditional market research. More importantly, customer behaviour can be tracked with greater accuracy than before via e-transactions and hence correlated with both the promotional stream and the intelligence gathering stream. Unless each organization and the chain as a whole can assess this information coherently, it is likely that major misinterpretations of changing demand patterns will create potential chaos in the supply chain. The issue is therefore that, in the e-commerce environment, three information streams that could previously have been reconciled off-line now have to be integrated if the value chain is to function economically.

A firm will not be able to determine its own destiny with regard to its information systems. It is not just a matter of company size, but clearly the larger players have more to gain and hence tend to force the smaller

companies to comply with their demands. As most industries develop standards for electronic trading and information exchange, the potential risks for the small company diminish since it will not have the cost of satisfying a variety of requirements for different suppliers or customers. The arrival of XML (Extended Mark-up Language) will produce a general standard for the majority of organizations to utilize and reduce the need for industry-specific standards for many types of information transfer.

According to Porter,<sup>8</sup> we are entering a new stage of evolution in terms of how IT is affecting industry value chains. Previously, each firm has achieved improved performance by integrating its activities and processes as well as *its* supplier and customer interactions through IS, most recently via Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) software packages. He believes this new stage, 'which is just beginning, enables the integration of the (...) set of value chains in an entire industry, ... as end-to-end applications involving customers, channels and suppliers ...'. It is difficult to predict whether the emergence of 'e-marketplaces' (or trading hubs) or the ability to integrate throughout the value chain will have the more significant effects on industry economics and customer/supplier relationships. Could trading hubs become the centres through which IRP ('Industry Requirements Planning') systems operate, linking everyone's ERP systems together to provide seamless, integrated information flows?<sup>9</sup> However, even in sophisticated and mature industries, there is often a huge gap between what is possible and the current reality. Box 5.1 gives examples of the problems in the motor industry value chain that needs major information systems and process changes if the benefits, potentially available from information integration, are to be realized.

By whatever means information systems are used to enable better information exchanges through the industry value chain, significant benefits can be obtained from the improved links. These benefits should enable a firm to spend more of its business energy in outperforming its real competitors rather than competing with its trading partners for the available profit. The essence of the argument is:

- (a) At any one time, an industry generates a certain amount of net profit (total sales — total costs). That profit is shared among the organizations contributing to the value chain for the industry. Clearly, intermediation increases the number of firms among whom the profit is shared, and the attraction of disintermediation is that the opposite occurs.
- (b) If, in the version of the value chain that includes our firm, the overall net profit can be increased, we can take a share of that increased

**Box 5.1** Information problems affecting the performance of the automotive industry value chain (*source*: M. Howard, R. Vidgen, P. Powell and A. Graves, 'Planning for IS related industry transformation: The case of the 3DayCar', in *Proceedings of the 9th European Conference on Information Systems, Bled, Slovenia, June 2001*, pp. 433–442, used with permission of the authors)

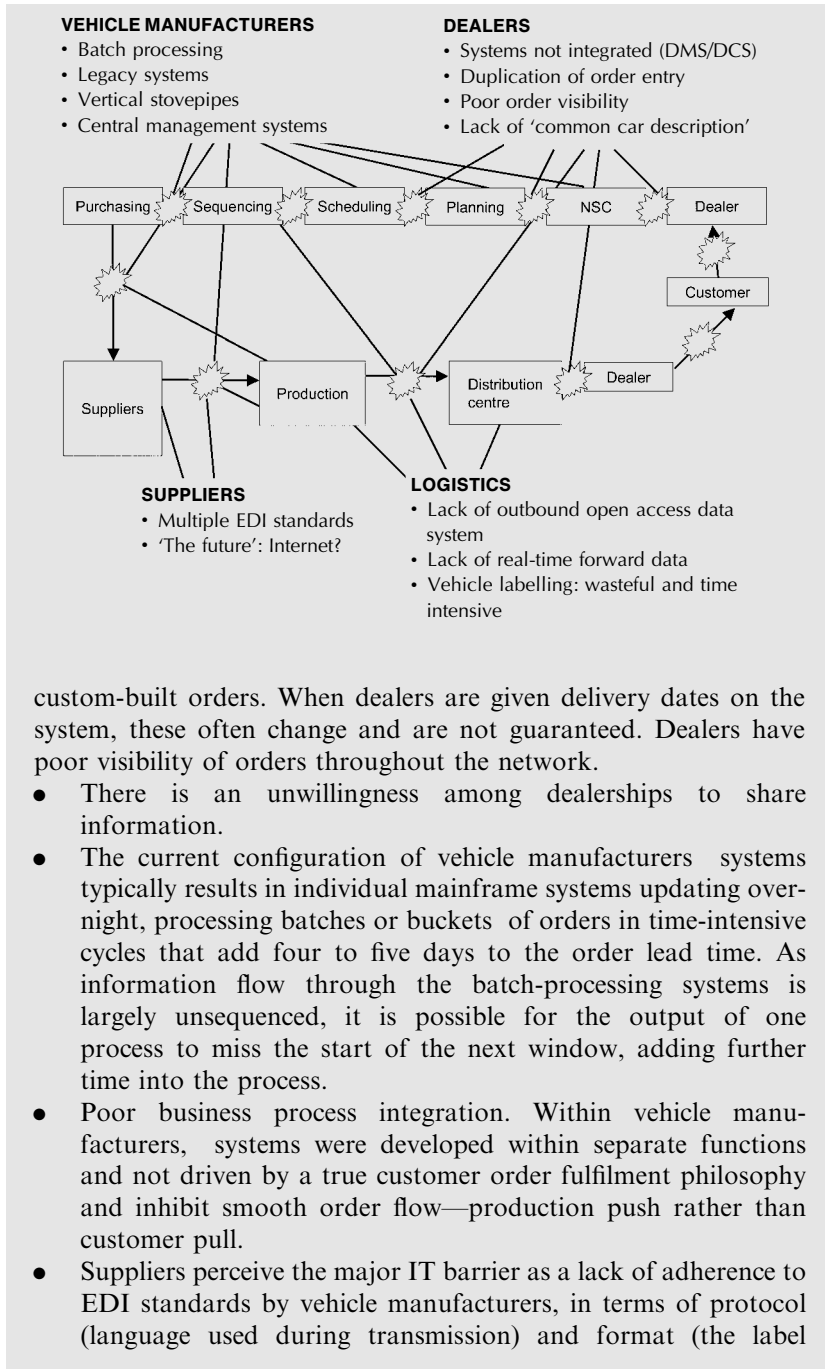
The automotive industry operates a sophisticated but complex IS/IT throughout the supply chain. However, current systems act as a major inhibitor both to time compression in the order-fulfilment process and to organizational change. For example, a customer order entered into a system at a car dealership must complete five overnight updates on existing IS, involving batch processing and code conversions, before it is released into vehicle production.

The European automotive industry is facing a period of significant change, driven by poor profitability, excess finished stock and overcapacity. Customers are more price conscious and less patient, demanding vehicles built to individual specifications and delivered in short lead times. Vehicle manufacturers can no longer rely on selling cars from existing stock and are shifting their business models away from mass production toward mass customization and build to order. This increases the importance of existing systems for efficient order execution and integrated information flow. Yet, many IS reflect the functional departments for which they were originally conceived.

The key objective of the 3DayCar project is to develop a framework in which a vehicle can be built and delivered to customer specification in minimal lead times, with three days order-to-delivery (OTD) time as the ultimate goal. The current average OTD lead time is 45 days. The diagram on the following page illustrates the current IT barriers among the key players in the automotive industry.

Problems and issues include:

- The lack of integration between Dealer Management Systems (DMS) and Dealer Communication Systems (DCS) causes high levels of typing and information duplication. For example, when an order is placed, significant levels of duplication of information occur, with identical data such as vehicle description and owner details typed into both systems.
- Many DCSs do not give a delivery date or have significant time delays in confirming them—a particular problem for





layout or visual interface). Suppliers already receive messages in about a dozen different formats, all of which must be converted to a common standard before they can be processed internally. This causes delay and disruption to the system, particularly in the event of a system malfunction.

profit and hence outperform our direct competitors, who are not part of that version of the chain.

- (c) If we initiate the changes but also share the benefit with our customers and suppliers (i.e. they too become more profitable), they will prefer to trade in our more efficient version of the industry. It is very likely that rival firms will be competing for those suppliers and/or customers—but they should give us preference because they are more profitable when they do. This brings about long-term advantages and in due course affects the whole industry structure.

To achieve (b), only three things can be done:

- (i) create more demand;
- (ii) satisfy more of the available demand (gain market share);
- (iii) reduce the cost of satisfying the demand.

By better information exchange through the value chain, all or any combination of the three can be done at the same time. For example, by sharing consumer market-research information obtained by retailers, a manufacturer may be able to enhance a product to open up and develop a new market segment. Or, earlier feedback on changing tastes may enable the production plan to be rescheduled to meet the new consumer preference. This is particularly important in fashion goods and in very seasonal products like toys. Benetton, the clothing company, has developed highly-integrated systems that link the franchised shops right through to the subcontractors who make the clothes. This enables them to respond faster than their competitors to changes in fashion and they are far more profitable than the average clothing company.

There are many ways in which better information exchange can reduce costs that occur at the boundaries between companies. Table 5.1 provides a number of examples, all of which can be seen in a number of industries, with the effect of reducing interorganizational costs very significantly.

**Table 5.1** *Reduction of intercompany costs due to better information exchange along the value chain—examples*

<i>Cost</i>	<i>Potential e-commerce impact</i>
1. <i>Administration</i>	Electronic transmission of orders and invoices, etc. directly between customers and suppliers
2. <i>Inventory</i>	Sharing information on stocks and demand to avoid both companies carrying unnecessary stock
3. <i>Transport/storage</i>	Optimizing delivery to ensure transport or storage space is utilized effectively to meet agreed service levels
4. <i>Design</i>	Sharing product design data interactively to enable faster development of a better product and less 'rework'
5. <i>Financing</i>	Electronic payments to improve cash flow and reduce the need for working capital and reduce Accounts Receivable and Payable costs
6. <i>Capacity</i>	Matching the use of resources across firms to avoid idle resources in one part of the chain and/or overload in another
7. <i>Services</i>	Linking third-party service suppliers to service requests to reduce delays in delivering and costs of administration

One final example may serve to illustrate the long-term effects of integrating information flows through a value chain. In 1982, UK tour operator Thomson Holidays introduced the TOP system, which enabled travel agents to book holidays via a Viewdata system directly on the Thomson computer. This immediately reduced some of the double-handling costs of bookings (in the travel agency and at Thomson) and speeded up the process of booking, hence saving agency time and cost. As a result, agents 'directed' consumers toward the Thomson brochure, since they earned more commission per man-hour spent booking the holiday. Later, Thomson developed similar links to their suppliers (airlines, hotels and other service providers). In effect, this enabled Thomson to respond better to changing demand than others, which for a number of years gave them an advantage, but other tour operators were still profitable since demand for holidays was increasing. The 'system', however, gave Thomson a major advantage when demand dropped suddenly as it did in 1987 (USA bombed Libya) and 1991 (Gulf War). In 1987, Horizon Holidays (No. 3 in the industry) failed and, in

1991, International Leisure Group (No. 2 in the industry) went bust. Neither of them were able to respond to the rapid changes in demand as effectively as Thomson, and both had lower margins due to higher cost structures. Thomson were able to adapt more quickly and were more efficient in the context of the overall industry value chain.

In summary, an understanding of the industry value chain, and the key information flows in the industry, can enable an organization to intercept and influence those information flows to its advantage, to the benefit of its trading partners and at the expense of its competitors. Box 5.2 is another example of a real value chain—for the ethical pharmaceutical industry (i.e. prescription drugs)—showing where information systems applications have had and/or are having a significant effect on the performance of the industry.

### **Customer Relationship Management and the Value Chain**

While the concept of Customer Relationship Management (CRM) emerged in the mid-1990s, key tenets underpinning the concept such as relationship marketing, customer value analysis and mass customization have been around much longer. However, they remained essentially theoretical concepts; aspirational rather than a practical reality. Technology has changed this, making CRM a feasible option for organizations by providing the tools to operationalize these concepts.

‘Customer resource life-cycle analysis’, described in detail by Ives and Learmonth,<sup>10</sup> is a powerful tool to analyse relationships with customers. By examining its customer relationships via the model, companies can determine not only when opportunities (and threats) exist for improved or new information exchanges but also which specific applications should be developed. Ives and Learmonth suggest that the Resource Life Cycle (RLC) model should be viewed from one end only (i.e. toward the customer), but the same possible options will apply in reverse in relationships with suppliers. Hence, the RLC model could be a customer or supplier resource life-cycle model, depending on point of view!

The RLC model relies on the fact that an organization’s products/services go through a typical life cycle, when viewed as a *resource* by the customer. The four main stages of this life cycle are:

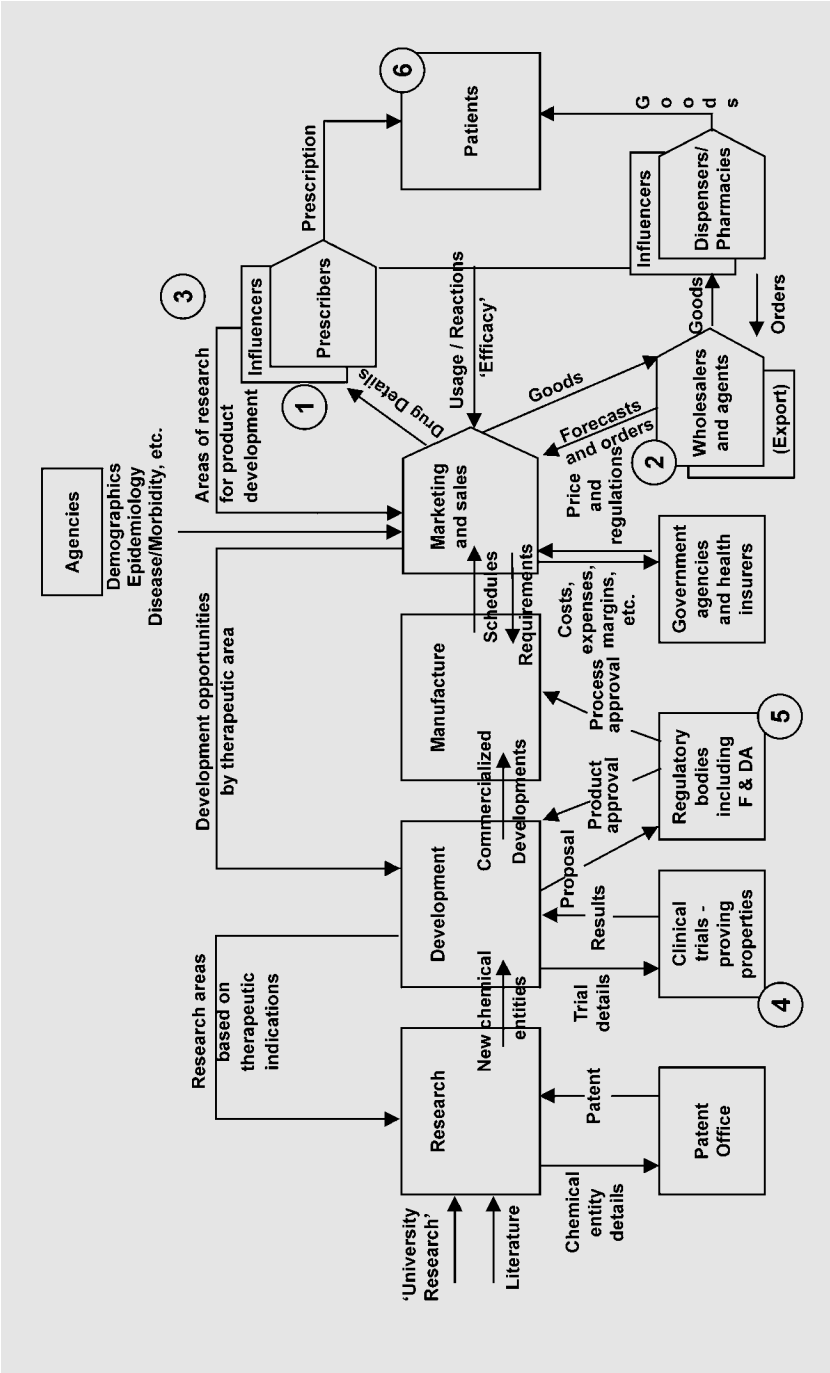
- requirements determination;
- acquisition;
- stewardship;
- retirement or disposal.

These are expanded in more detail in Table 5.2.

**Box 5.2** Value chain for pharmaceutical company

*N.B.* This is for an 'ethical' drug company where the whole strategy is based on differentiation of the product and its treatment efficacy. Key areas where information flows/relationships are critical to success and provide opportunity to gain advantage or achieve significant performance improvements:

1. Provision of drug information to clinicians/doctors who will prescribe the treatment and the influencers—either eminent people in the field and/or 'panels' of experts who advise hospitals, etc. Traditionally, these were medical people, but now they include health economists and insurers who decide on the financial aspects of the treatment's effectiveness in relation to alternative uses of funds. The same influencers also determine whether pharmacists will 'stock' the drug and dispense it. In return, the prescribers and dispensers feed back information on the use of the drug and, particularly importantly, any side-effects or adverse reactions encountered. Unless this 'loop' is well managed, a drug can fail, especially a new drug.
2. The pharmaceutical company relies on forecasts of requirements and then orders from third parties (wholesalers may be the distribution channel for 80% + of drugs to dispensers) in order to set schedules, etc. for manufacturing. This is a particular problem with new drugs where forecasts rather than orders drive the production scaling/economics. Underestimates lead to lost sales, overestimates to significant waste and cost. The quality of forecasts and, then, consistency with order patterns are key, making online demand and supply information exchange crucial to both parties.
3. The skill in pharmaceutical market research is to establish both the nature and size of the market from a variety of particular and statistical data and to determine a development opportunity in a therapeutic area where the company has distinctive skills/competency. Often, today, the opportunities arise from gaps in current treatments, which are known to influencers mentioned in Item 1 above. Collecting data from diverse sources and interpreting them can be greatly assisted by electronic data input.
4. Testing of a drug during development can take many years, and reducing the development time from, say, 8–12 years to maybe 5–6 means more of the patent life is unexpired for production, and this affects drug profitability dramatically over its patented



- life (hundreds of millions of pounds). Much testing is in-house and controllable, but clinical trials by doctors must be done outside the organization and can take many years. The key to success is organizing the trial—getting the right clinicians to test it on the right population, which requires good information on the test population, etc. to avoid delay and wasted effort. Equally, getting the results in is a major data collection/logistics exercise where ‘e-commerce’ is essential both for speed and gathering comprehensive/valid trial data.
5. To be able to produce the drug, regulatory approval must be obtained by submitting all the evidence about the drug—this can run to 120,000 pages! The most demanding agency is the US FDA (Food and Drug Administration). Once the proposal is submitted, endless questions will be asked and if the information is not well organized the queries can take months to resolve. Most drug companies use IT to develop/store/submit the package of information and enable the regulatory authority to enquire into it electronically. This again can save considerable time and reworking of data to satisfy the regulators and speed up the time to market the drug.
  6. With the increasing access consumers have to information via the Internet, many ‘patients’ now inform their doctors of the treatment they think they require! In the USA, ‘self-prescription’ is now an option for some drugs, although, in the UK, the doctor still has to prescribe the drug. However, as information is increasingly available to the public, it is likely the value chain will have to include the patients more effectively, rather than leave them isolated as suggested in this model.

Each of these stages involves a number of processes of information exchange—between buyer and seller—to enable the stage to be managed effectively, thereby ensuring maximum benefit to the buyer and seller. If at any stage the exchange breaks down, either the current transaction or future business will be adversely affected. The further through the life cycle the information exchange has gone, the higher the switching cost to the customer, who will have to retrace the steps at additional cost and inconvenience with another supplier.

In essence, the RLC analysis forces consideration of what happens to the product or service once it has become part of a customer’s value chain or while it was part of the supplier’s value chain and, thence, leads to information relationships between buyer and seller over an extended

**Table 5.2** *Resource life-cycle analysis (source: after Ives and Learmonth)*


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<i>Requirements</i>	
Establish requirements	To determine how much of a resource is required
Specify	To determine a resource's attributes
<i>Acquisition</i>	
Select source	To determine where customers will buy a resource
Order	To order a quantity of a resource from the supplier
Authorize and pay for	To transfer funds or extend credit
Acquire	To take possession of a resource
Test and accept	To ensure that a resource meets specifications
<i>Stewardship</i>	
Integrate	To add an existing inventory
Monitor	To control access and use of a resource
Upgrade	To upgrade a resource if conditions change
Maintain	To repair a resource, if necessary
<i>Retirement</i>	
Transfer or dispose	To move, return or dispose of inventory as necessary
Account for	To monitor where and how much is spent on a resource

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timescale while the product/service is being consumed or, in reverse, while it is being developed and made available. Most of the steps in the four stages can be improved by direct electronic links and by asking 'how can e-commerce (or IT) improve our ability to help the customer to ...?' can identify quite specific opportunities to enhance the relationship.

The RLC model suggests that the information relationship is an extended one, eventually resulting in a replacement sale or purchase. The life cycle may be very short (days) for consumable items, but many years for capital items.

A slightly extended and updated version of the basic model is described by Feeny<sup>11</sup> to address the increased ability of online service provision to meet a wider range of customers' requirements at lower costs via the Internet. Gathering information about the customer throughout the relationship life cycle becomes much easier, and more economic, as more information exchanges become electronic. Information gleaned 'post-purchase' from customers is the most valuable in terms of understanding what they actually value regarding service and product requirements and preferences.

An example of the use of a 'technical service' system in adding customer value to what is essentially a catalogue can perhaps help demonstrate the ideas. RS Components, a business-to-business distributor,

offering a large range of electronic and mechanical components and tools through catalogues, has achieved major advantages in dealing with its customers (engineers) by paying particular attention to Stage 1 as well as developing very responsive and efficient systems to deal with Stage 2. Often, a customer will phone, or enquire via the Internet, not knowing what he or she wants, merely able to describe the symptoms of a problem with a piece of equipment. By putting technical data about the majority of its products online, about 80% of such 'problems' can be converted to appropriate component orders for delivery within 24 hours by the engineers themselves or by staff with little or no technical knowledge. The remaining 20% need to be considered by the company's technical staff. The system is to help the customer specify his or her requirements and to ensure that the parts dispatched are those most likely to solve the customer's problem.

Already, e-commerce has been used by many firms to help customers establish and specify their needs by providing more extensive information than ever before with easy access. Many new entrants provide 'sourcing' systems via e-commerce to enable buyers to find the best deal. New means of trading, to enable customers to obtain the product/service, have been introduced, including customer pricing against which the supplier can choose to sell. Home delivery has grown dramatically to balance the new remote buying. The challenge is how to gain and maintain customer loyalty in the new environment through 'stewardship' services that encourage further purchases. This depends on establishing an electronic dialogue with the customer to learn more about them and tailoring the relationship as individually as possible to their needs. Customer Relationship Management (CRM) systems are designed to cover the whole life cycle, providing a comprehensive view of the customers' pattern of interactions and relationships with the firm, enabling tailored and proactive rather than reactive approaches to meeting their needs.

A similar technique for generating information systems ideas during value chain analysis—the 'strategic option generator'—has also found renewed favour with the rapid developments in e-commerce. The approach was described by Rackoff *et al.*<sup>12</sup> and is explored in great detail by Wiseman.<sup>13</sup> It considers the impact of IS/IT in relation to:

- *Suppliers*—anyone supplying essential resources. It may be necessary to subset them either by the nature of what they supply or their strength, or their ability to exert pressure on you and other customers.
- *Customers*—this could include the consumers as well as direct customers if the latter are essentially distributors. The customers should



be segmented in terms of what (and what else) they buy or how much leverage they exert.

- *Competitors*—obvious competitors who sell very similar products or services should be supplemented by actual or potential new entrants into the market and ‘threatening’ substitute products and services should be included as competition. Consideration should also be given to the threat of new intermediaries or options for disintermediation by others.

For each of them, alternative ‘strategic thrusts’—offensive or defensive moves—can be made by the firm:

- *Differentiation*—ensuring that superior quality is delivered and perceived, leading to obtaining a premium price. It could also imply being a ‘preferred customer’ to obtain preferential service.
- *Cost*—being cheaper or enabling suppliers or customers to reduce their costs (sharing the benefit) and thereby preferring to conduct business with the firm (ways may also be found to increase competitors’ costs!).
- *Innovation*—introduce a new product, service, process or way of doing business that transforms the relationships and competitive forces in the industry. This may require the active involvement and cooperation of suppliers and/or customers.
- *Growth*—enable volume or expansion in geography or increased flexibility of production and distribution to meet different segments needs.
- *Alliance*—forging agreements, joint ventures or joint investments in systems to prevent new entrants or competitors achieving advantage.

It may be that each of the above are appropriate with different groups of suppliers or customers or even competitors, implying that a great variety and range of options could be identified, many of which may prove infeasible!

To identify what benefits are potentially available, a questionnaire approach is suggested. Table 5.3 shows some sample suggested questions that might lead to the identification of options. Some of the questions imply a degree of lateral thought. For instance, ‘reduce suppliers’ costs’ tends to go against the grain! The full question should be perhaps ‘reduce the suppliers’ cost, when he does business with us’ (in order to create more profit in the chain and share the benefit).

The strategic option generator approach relies on a thorough understanding of the state of the industry, the firm’s competitive position, the determining factors for success in the industry value chain, plus a clear

**Table 5.3** *IS/IT opportunity analysis—questions*

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1.	<i>Suppliers</i> —Can we use IS/IT to: Gain leverage over our suppliers (improving our bargaining power or reducing theirs)? Reduce buying costs? Reduce the suppliers' costs? Be a better customer and obtain a better service? Identify alternative sources of supply? Improve the quality of products/services purchased? etc.
2.	<i>Customers</i> —Can we use IS/IT to: Reduce customers' costs and/or increase their revenue? Increase our customers' switching costs (to alternative suppliers)? Increase our customers' knowledge of our products/services? Improve support/service to customers and their needs? Identify new potential customers?
3.	<i>Competitors</i> —Can we use IS/IT to: Raise the entry cost of potential competitors? Differentiate (or create new) products/services? Reduce our costs/Increase competitors' costs? Alter the channels of distribution? Identify/Establish a new market niche? Form joint ventures to enter new markets? etc.

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business strategy. It is most helpful in being specific about who will benefit and how from the options for change in relationships through the value chain.

**THE INTERNAL VALUE CHAIN**

Much of what has been said about the external value chain above applies to the firm's internal value chain—the contribution of these activities to the creation of value in the organization as well as the relationships between its value-adding activities. Before trying to improve the organization's internal use of information, its wider role in the industry needs to be understood, since those external interfaces should be a major influence on the way information is gathered, organized and used in the organization. In many cases, the actions of trading partners and competitors will have a direct impact or constrain what the company would ideally like to do.

The purpose of Internal Value Chain analysis, like many other techniques for assessing and improving how a company operates, is to divorce *what* the company does from *how* it does it (i.e. look at the activities it performs, to contribute to the value-adding processes of the industry, rather than its organization structure). Historically, the information systems a company has will have usually resulted from the organizational needs at functional and departmental level. Only subsequently will these systems and information resources have been aligned to the processes that the firm carries out to satisfy its customers and govern the business. This means that the systems tend to fit the functional structure well, but are less effective in ensuring an appropriate flow of key information through the business to optimize its overall performance. As external trading relationships change, the internal processes and systems will also have to change to enable the new business model to operate efficiently.

The value chain approach first distinguishes between two types of business activity.

- (a) *Primary activities*—those that enable it to fulfil its role in the industry value chain and hence satisfy its customers, who see the direct effects of how well those activities are carried out. Not only must each activity be performed well, they must also link together effectively if the overall business performance is to be optimized.
- (b) *Support activities*—those which are necessary to control and develop the business over time and thereby add value indirectly—the value being realized through the success of the primary activities.

Each activity adds value in terms of creating a product or service that generates revenue from customers or enables value-adding activities to be coordinated or ensures that value has been added, at an acceptable cost. Some activities only add value if they are effectively integrated across primary and support parts of the chain. These are often information intensive activities such as forecasting—estimating demand, planning capacity and scheduling resources and activities—and pricing, which requires input from many components in the chain and will have effects on many others.

In a multi-unit business, each operating unit will have a set of primary activities it must perform successfully to satisfy its set of customers. The support activities, or some of them, may be shared by the operating units because it is more cost-effective to do so, or because there are synergistic benefits by providing a central service to each of the units (e.g. Human Resource Management, Finance or IT).

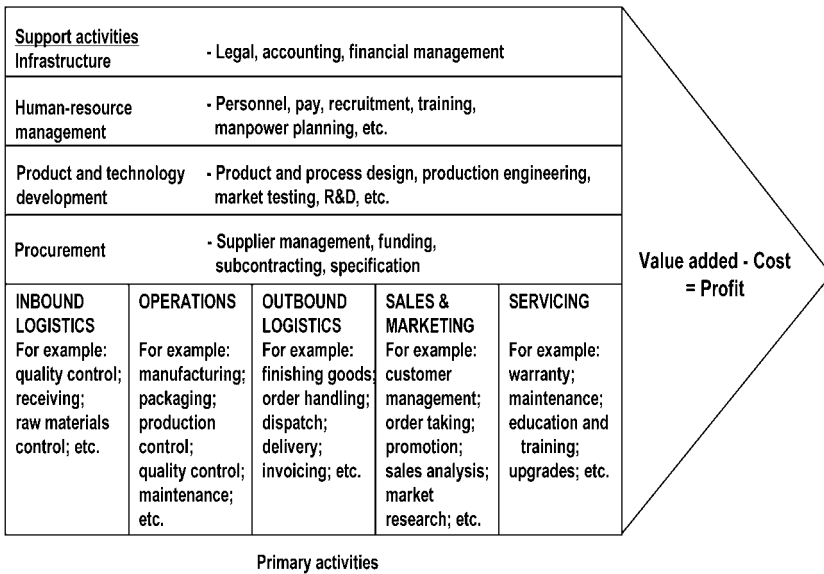
### **The Traditional Value Chain Model**

Porter<sup>14</sup> classifies the primary activities into five groupings, which can be considered in sequence starting with suppliers and ending with customers:

1. *Inbound logistics*—obtaining, receiving, storing and provisioning the key inputs and resources in the right quality and quantity to the business. This may include recruiting staff as well as buying materials, components and services and dealing with subcontractors and acquiring equipment.
2. *Operations*—transforming the inputs into the products or services required by the customers. This involves bringing the resources and materials together to make the ‘product’ (e.g. a car) or provide the service (e.g. a banking current account).
3. *Outbound logistics*—distributing the products to the customers either direct to the consumer or to the appropriate channel of distribution, so that the customer can obtain the product or service and pay for it appropriately (e.g. a car could go via a dealer to the customer, although it is possible for the customer to buy direct from the manufacturer and have the car delivered from the factory; or the delivery of cash to a bank customer via an Automatic Telling Machine (ATM) installed in a grocery retailer).
4. *Sales and marketing*—providing ways in which the customers and consumers are aware of the product or service and how they can obtain it, including how to induce them to buy or use the product or service. This would apply to a new car model, or a bank account, but also to cancer screening in the Health Service, for instance.
5. *Services*—adding further value by ensuring the customer gets full benefit or value from the product once purchased (e.g. car warranty, or information on how to use a bank account to avoid unnecessary charges).

Porter’s structuring of the activities fits most easily to a manufacturing company, but, using the same logic of obtaining resources, transforming them, delivery, getting the customer to ‘buy’ and then get maximum value from the product or service, value chains can be drawn for any business.

Figure 5.6 shows sets of activities grouped in the structure described above and also some of the associated support activities we would expect to find in a manufacturing company. The nature of the primary activities a firm performs will to an extent be predetermined by the industry, its products, customers and suppliers—its success is determined by how well it performs the range of primary activities in concert. That will decide



Many activities cross the boundaries - especially, information-based activities such as: sales forecasting, capacity planning, resource scheduling, pricing, etc.

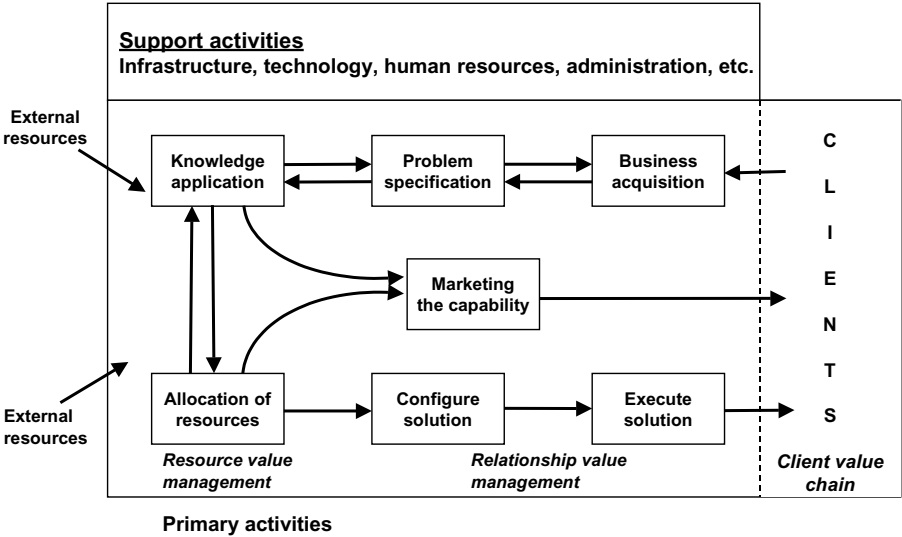
**Figure 5.6** Firm's value chain—manufacturing example

how much value is derived and how much the activities cost and, hence, the primary profit margin.

## ALTERNATIVE VALUE 'CONFIGURATION' MODELS

The traditional value chain model was based essentially on a manufacturing/retail view of industry and works well for 'physical goods'. However, while it can be applied quite successfully to some service businesses, in many others it does not really represent what the business does or its relationships with customers and suppliers. For example, most aspects of insurance and investment businesses involve no physical product (except paper and money), nor does the model represent businesses where suppliers can also be customers (e.g. banking) and it is especially weak in describing many newer service businesses like those based primarily on electronic commerce.

Stabell and Fjeldstad<sup>15</sup> describe two alternative 'value configuration' models that attempt to address these problems. The focus is on the primary value chain activities since the support activities are often very



**Figure 5.7** Value chain: service businesses ('Value Shop') (client is actively involved in and affected by the processes) (source: after Stabell and Fjeldstad)

similar to the Porter model. They call these two alternatives: 'Value Shops' and 'Value Networks'.

*Value Shops* are businesses that essentially are 'problem solving', delivering value by providing solutions for clients. They are characterized by intense and extensive information exchanges both in setting up the business transaction and delivery of the solution. Examples are as widespread as oil exploration companies, design engineering, management consultancy, insurance, advertising, etc. They are characterized as non-flowline, since each problem is, for the client, unique and the client is normally involved in both the design and implementation of the solution.<sup>16</sup>

Figure 5.7 shows an example of such a value chain, which better reflects a service business, where the objective is to satisfy the client or customer requirements, by bringing together the appropriate knowledge and resources from inside the firm or by using other external resources.

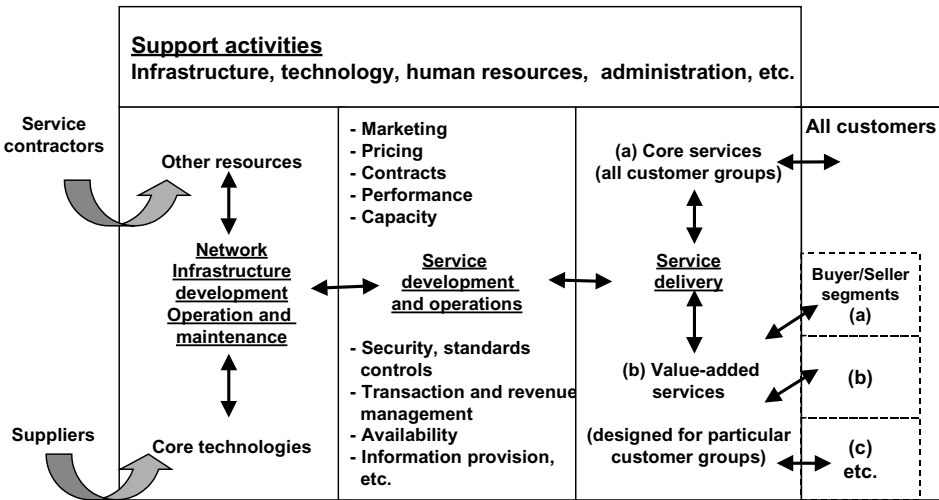
The chain involves two flows, to determine the client needs and (assuming they can be met) designing and implementing a solution that satisfies the client requirement. This can be relatively simple (e.g. a new hairstyle) or very complex (a new oil refinery). Considerable information exchange is often required (in the more complex situations!) and IS/IT offers opportunities to increase the efficiency of such exchanges, reduce elapsed time and improve the accuracy of the exchange.

*Value Networks* are businesses that provide exchanges and mediation between buyers and sellers, enabling relationships to be established. They earn revenue from either or both in their use of the firm's network 'everyone's a customer'. The UK's Post Office is an example both in its mail and parcel delivery and its counter services where it is acting as an agency for government service delivery (DVLC, Social Security, etc.). The services may extend beyond connection to revenue collection, contract management, systems integration, information source, etc., in terms of adding additional value for a customer or customer segment. Many new Internet Service Providers (ISPs), cable and media companies as well as more established telecoms providers are in this group as well as a range of financial service and investment businesses (e.g. share trading). Many of the new online trading models (auctions, clubs, etc.) are Value Networks. No doubt many more will emerge in the future.

The primary activities of such firms include infrastructure development and maintenance to provide capacity and access, service provision to cater for the needs of different buyer/seller relationships and promotion to both buyer and seller groups to recover the capacity costs via transaction-based revenues. Figure 5.8 suggests how this model differs from the other two.

In all types of model, information about what customers want and how that demand can be satisfied should flow freely through the organization, enabling the management of each activity to determine how best to deploy its resources to maximize customer satisfaction in the most effective way. Any action taken would be immediately visible to other activities in the chain, who can then take further action accordingly or inform the other activities of problems in meeting the requirement. The chain can be continuously rebalanced across all the activities. In addition to the flow through the organization, each activity (e.g. warehousing, sales force management) will need information systems to carry out and manage its part of the business. In themselves they may be very extensive but should link in to the flow as required. For instance, the warehouse management system must know where every item is in the warehouse, but the rest of the business only needs to know what is in it, and, while the manufacturing department needs to schedule each machine in detail, the rest of the business only needs to know that products will be ready to meet orders from customers. Equally, in a consultancy-type business, resource management activities do not need to know the detail of each assignment, but need to know who is committed and for how long.

One engineering company, producing electrical switching systems, studied how information flowed through the primary activities involved and were able to simplify the flows from the customer enquiry through to



**Figure 5.8** Value chain: service businesses ('Value Network') (source: after Stabell and Fjeldstad)

the component suppliers, and back again, to reduce delivery lead times from 27 to 5 days. The result was a 37% increase in sales—sales they were losing because their delivery times were too slow and unreliable. That was only for one product, but, when the same logic was applied across the whole product range and associated processes, dramatic performance improvements were made, often at very little cost and with the result that the systems became much simpler. Once these improvements have been made, e-commerce investments to enable online enquiry and ordering were able to deliver further benefits rather than cause even more operational problems.

### THE USE OF VALUE CHAIN ANALYSIS

Value chain analysis is essentially a form of high-level industry, and business process/activity analysis—a way of describing an industry as a network of key components and their interrelationships. The basic, rather structured, concept of the value chain—the 'big arrow'—is sometimes difficult to apply to non-manufacturing industries where the product is not tangible and there are no obvious raw materials. A bus company, the police, car hire, building societies, estate agencies, the Inland Revenue and education are all examples where the five linear components of the



internal value chain are difficult to identify. The two more recently developed value models—‘shops’ and ‘networks’—are more helpful in describing how activities interrelate to provide the customer with value. And all activities cost money! The process of analysis should be relatively flexible, describing ‘freehand’ the relationships among the customers, the service/product and the resources consumed. The main objective in all cases is to represent the main activities in the business and their relationships in terms of how they add value so as to satisfy the customer and to obtain resources from suppliers—not in terms of how the organization currently is structured—(i.e. to focus on core business requirements). By considering that value chain as a component of an industry value system, a broader view of systems implications and opportunities can be determined. It is equally important to separate those primary activities from support activities that are there for organizational or institutional purposes and only indirectly contribute to adding value! Organizations have greater discretion over how they carry out support than primary activities, since the latter have to fit successfully into the processes of industry.

However the value chains are drawn, they can enable further analysis of any or all the following:

- The information that flows throughout the industry and how critical that information is to the functioning of the industry and the success of the firms in it, by determining where and when that information is available, who has it and how it could be obtained and turned to advantage or used against the firm.

For instance, in some industries like fashion goods, ‘demand’ information is the critical factor, but, in others such as confectionery (the price and availability of cocoa) and timber (the price and availability of wood), ‘supply’ data can be critical to success. Manufacturers who have good information and can respond to changing demand/supply fastest can outcompete those who lack the relevant information. In the UK timber industry, the price of softwoods is affected over a six-month cycle by the US building industry, ‘housing starts’ in the USA determining availability and price elsewhere. As the world’s largest purchaser of wool, Benetton would find huge stocks on its hands if it failed to anticipate and satisfy demand—hence, the importance of its point-of-sale system in its franchised shops to obtain daily sales data in a volatile market.

- The information that is or could be exchanged with customers and suppliers throughout the chain to improve the performance of the business or lead to mutually-improved performance by sharing the

benefits (e.g. the information that is required for the customer to sell on the product/service or the supplier to acquire input resources).

Suppliers of particular components or resources may have longer lead times than appropriate, given the volatility of the company's business. Providing plans for forward requirements, even buying on its behalf to spread both companies' risks, might help. The information links between companies are far more complex than often appreciated and the value chain approach allows them to be analysed. Obviously, the use of electronic commerce is becoming the main basis for such information sharing across various companies' information systems.

In the 1980s and early 1990s, EDI-based systems were seen as a major strategic option for most organizations. The reality has been that major players in certain industries, usually retailers, generally determined the strategic impact of EDI by their action or inaction. A study by Benjamin *et al.*<sup>17</sup> concluded that, for the majority of organizations, 'EDI applications will be built out of competitive necessity ... and will become a cost of doing business.' The evidence of the study showed that EDI for basic business transactions will provide, at best, short-lived advantages, since they are easily copied. Sustained advantage comes from changing the relationships with trading partners and using the information exchange to conduct business in new, mutually-beneficial ways, as explained earlier. This is almost certainly true of the Internet and e-commerce applications. Once the available cost savings have been 'shared out' equitably between buyers and sellers, advantage will only accrue to those who innovate in business processes, provide new value to customers and/or can find significant numbers of new customers to satisfy.

- How effectively the information flows through the primary processes and is used by them:
  - within each activity to optimize performance;
  - to link the activities together and avoid unnecessary costs and missed opportunities; and
  - to enable support activities to contribute to the value-adding processes, not hinder them.

Historically, systems were first developed to meet functional needs, and the links between them from marketing to outbound logistics, for instance, were added later. This often resulted in armies of people with the generic job title of 'professional reconciler', working to overcome the weaknesses at the system interfaces. Many business re-engineering initiatives often accompanied by implementing inte-

grated software packages have been focused on eliminating such inefficiencies. One insurance company reduced the number of 'handlings' of new policy details from 14 to 3 without any loss of control. Porter suggests that the companies who succeed with IS are those who link their systems together along the value chain most effectively. For instance, it may be most effective to supply daily sales data in its raw form direct to the procurement and inbound logistics activities to determine ordering requirements much earlier. Otherwise, they could effectively hinder the marketing effort in the long term.

### 'NATURAL' AND 'CONTRIVED' VALUE CHAINS

O'Sullivan and Geringer<sup>18</sup> explain how, by understanding the role of information in both 'internal' and 'external' value chains, major business performance improvements can be made by changing how the chain works. They introduce the concept of 'natural' and 'contrived' value chains. The natural value chain describes the (unattainable) optimum structure for the industry's value-adding processes and information flows, based on *what* needs to be done. The contrived value chain shows *how* (in far from optimal ways) things are currently done. They identify characteristic differences in natural and contrived value chains. These are shown in Table 5.4. The first purpose in analysing the value

**Table 5.4** *Natural versus contrived value chains*

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*Contrived value chain* represents *how* things are done by resources in the industry/organization:

- driven by organization structures, historical evolution and compromise
- is often very complex, confused and 'messy', and poorly understood
- contains many reconciliation activities and reacts slowly
- can take many forms, is continuously being modified to meet business changes

*Natural value chain* represents *what* has to be done to succeed in market requirements:

- based on value-adding activities and the resources needed to carry them out
  - defines essential interrelationships and dependencies and the ideal way to achieve business purposes
  - contains few reconciliation activities and responds quickly
  - usually only one ideal exists, and it does not change significantly or frequently
-

chain in information terms is to reduce the existing complexity either inherent in the current information relationships or caused by them. The second purpose is to identify new, often faster, options for information to flow to where it enables the value-adding processes to be performed more effectively and at the ideal time. In doing so, the way the chain works should change from whatever 'contrived' state it has reached through evolution to something more like the 'natural' view of the chain.

In order to achieve this and to ensure that the more beneficial IS/IT investments are identified, it is important to start with an understanding of the overall external value chain and how it affects the internal value-adding processes. Otherwise, even significant IS investments may deliver no noticeable overall benefit and they may even result in business disadvantages due to the actions of others in the chain.

## **BUSINESS RE-ENGINEERING AND THE VALUE CHAIN**

The upper three levels of impact of IS/IT on business described in Chapter 1, from the MIT's *Management in the 1990s* Research Programme, requiring revolutionary change or transformation include two—process redesign and network redesign—that imply changing the internal or external value chain components and relationships. Business re-engineering, as a mechanism for strategic change, normally includes a significant process dimension, which will lead inevitably to implications for IS/IT. Most of the successful business re-engineering initiatives have also had an external drive or focus, ensuring that internal changes deliver perceived improvements to the customers. Almost by definition, the starting point for determining what to change, why and how to change it, is an understanding of the value-adding processes in the industry and/or the firm.

Much of the information systems and business re-engineering literature uses the same words for defining the actions to take to improve business performance: eliminate unnecessary processes, then rationalize the rest to ensure the value-adding processes are optimized, integrate to improve responsiveness and reduce unnecessary effort and error; finally, automate where technology can deliver further improvements. By the 1990s, in many companies, IT had become a constraint to redesign, because, in the past, IT used to automate badly-designed processes that had become expensively petrified in silicon! In many ways, business re-engineering is a restatement of the aims of IS investment over the past 30 years, but those aims were often subverted in the drive to employ IT. In many organizations, the need for rapid, relatively radical change is now imperative and IT provides a wide range of capabilities to assist in

implementation. Rather than devise their own business models and hence core systems, many organizations have implemented enterprise systems software packages (e.g. ERP and CRM) to obtain those new business processes and modern, upgradeable software. These solutions involve adopting a value-chain-driven approach to understanding ‘how the business works’ and hence can be improved via a combination of business re-engineering and new IS.

## SUMMARY

Information systems have always been part of the value-adding processes that comprise any enterprise, whether it be a commercial company, a public service or a charitable body. Historically, though, IS/IT has been mainly deployed to improve individual component processes or activities of the enterprise. Initially, this improvement was targeted at reducing the costs of the supporting activities rather than improving the performance of the primary activities of the business. Even when systems became focused on primary activities, they tended to be aimed at optimizing the performance of the main operational activity of the business, and only then on activities that directly interact with suppliers and customers, but with a view to not compromising or jeopardizing the effectiveness of internal operations. Historically, the emphasis has been on:

- internal operations and control;
- key processes in the organization;
- internal critical success factors;
- the firm not the industry.

The value chain analysis techniques suggest that the firm’s information systems should be considered in an extended context—that of the industry value chain—in order to achieve maximum leverage from IS/IT investments and benefits from industry and internal developments. The value chain represents the flow of goods and services and use of resources through the industry, and there are simultaneous, parallel flows of information running through the industry. The value chain analysis tools make the organization consider how those industry information flows affect the firm, and, potentially, how they can influence it and where it is worth investing to achieve superiority with respect to others by exploiting the information and its flow or avoid being disadvantaged by the actions of others. This form of analysis also enables the

assessment of existing systems and known requirements to be considered in a broader and longer-term context.

In planning future information systems and technology for an organization, it is important to identify the business opportunities and threats presented by the increasing and developing use of IS/IT in the firm's industry. The objective is to identify strategically-important applications, those applications that directly support chosen business strategies or enable new business strategies to be developed and implemented. If the organization is not in a strictly-competitive environment, strategic applications will be those focusing on meeting organizational objectives. These strategic applications are only a part of the organization's IS application portfolio, but a very important part.

This chapter has described a number of approaches that can be taken to understand an organization's information and systems possibilities and the potential business benefits. The use of each technique has been exemplified by what others have done. The various techniques have been described from the 'top down', from the industry down to particular aspects of information exchange with customers or suppliers. Beneficial options can arise at any stage of the analysis or equally by inspiration. The various models used also offer a basis for testing the value of 'good ideas' resulting from *ad hoc* inspiration.

There are undoubtedly other techniques that could have been considered here—the most widely-accepted ones have been included. All these techniques have a common theme—they must be used by people with knowledge of the business and its environment, and therefore cannot be tools for IS/IT specialists alone to use. Senior management and line managers must become familiar with the basic approaches to this type of analysis. All the tools and techniques described are really IS/IT subsets of business strategic analysis tools, which should enable such managers to become actively involved in determining the future potential, both potential opportunities and potential threats, that IS/IT has to offer the organization.

In the next chapter, the ideas of this and the preceding two chapters will be brought together—in terms of how they can be integrated into the process of IS strategy development.

## ENDNOTES

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