Inter-firm Relationships and Networks

Learning outcomes

After reading this chapter you will:
• appreciate that the traditional approach to business marketing based solely upon influencing organizational buying behaviour assumes that the marketer is active while the customer is relatively passive;
• recognize that value creation in business-to-business exchange comes from a clear understanding of the relationship between buyer and seller;
• know what is meant by relationship concept and what variables affect business-to-business relationships;
• appreciate the range of tasks involved in continually managing a relationship; and
• recognize the impact that the network concept has upon business-to-business marketing and the strategic imperative of network thinking.

Introduction

Arguably, the greatest change in the marketing discipline in the last 40 years has been the renewed emphasis upon the relationship between marketer and customer as the basis of understanding and sustaining value creation in exchange, an emphasis that the ‘marketing mix’ approach underemphasized. This realignment originated in the business-to-business context (see, for example, the challenges to the prevailing orthodoxy evident in the work of the IMP Group of researchers (Håkansson 1982; Turnbull and Valla 1986; Ford 1990, 1997, 2001)). However, the refocusing has also extended to the consumer context, driven most notably by the emerging literature on consumer services (Gummesson, 1987) and has been hailed as a ‘paradigm shift’ (Grönroos, 1997) in marketing theory and practice. This chapter recognizes the central role that
relationships play in business markets and discusses how marketing theory and practice has developed in the light of this recognition.

The chapter commences with a reappraisal of the earlier coverage of organizational buying behaviour, identifying the deficiencies of a marketing approach based solely upon an analysis of buying centres and attempts by the marketer to influence the buying behaviour of the customer. It then proceeds to re-examine the basis for business marketing, arguing that successful business-to-business marketing comes from an understanding of value-creating exchange. In exploring exchange, a selection of key theoretical perspectives is introduced, along with the key variables that they use, to indicate the contribution they make to our understanding of relationships. Business marketing means constantly appraising relationships in terms of these variables and making changes within relationships cognisant of the effects upon the variables and the relationship at large. These are enduring tasks for the business marketer.

Though the relationship between marketer and customer assumes the greatest import in the coverage, the chapter goes further than the level of the relationship. It extends the relationship concept to incorporate the network of relationships that surround any single relationship; the strategic understanding of a relationship comes from an understanding of the network within which it is embedded and that affects it directly or indirectly. While managerial action typically takes place at the level of a relationship, strategic thinking also takes place at the network level so that it can be enacted at the level of individual relationships.

**Inadequacies of traditional approaches to business marketing**

Traditional approaches to business-to-business marketing, often subsumed under the ‘4Ps’ (standing for product, price, promotion and place) or ‘Marketing Mix’ labels, tend to make several assumptions:

- Essentially, the marketer and customer operate separately, wholly independently, and at odds with each other. Marketers market and customers purchase, and as a consequence each has essentially conflicting interests in exchange. Ideally, the marketer wants to obtain the best price possible for his or her goods, which are preferably standard offerings. Ideally, the purchaser wants to obtain the lowest price possible for goods/services that require no further customization. These opposing positions mean that each purchase decision and the associated transaction assume great importance in the dealings each has with the other.

- The marketer is active while the customer is relatively passive. The traditional approach tends to assume that the marketer is the active party in a business-to-business exchange, bringing offerings to the attention of customers. In this respect the customers are relatively passive recipients of the offerings created by the active marketer.
The marketing process typically involves the study of the buying behaviour of business customers, as detailed in Chapter 2, as a precursor to attempts by the marketer to influence that behaviour in their own favour. The marketer establishes the customer need via traditional research activities. It is the marketer that creates an offering that meets this need and then attempts to influence the customer’s decision-making to ensure the evoked set of offerings from which the customer chooses will have this offering at the head of the list.

The traditional marketing approach has been criticized more generally for being overly prescriptive, with the implementation of marketing in practice often lacking a clear conceptual basis because the concept itself has become more of an ideology than a well supported, clearly elucidated set of principles that benefit the firm (Brownlie and Saren, 1992). However, in the business-to-business context the traditional approach to marketing embodied in the 4Ps has been criticized more specifically for lacking relevance to the way in which business markets actually work (Arndt, 1979; Håkansson, 1982; Ford, 1990). While there is no doubt that success in any market comes from a strong understanding of customers and their needs, in business markets customers are often as active as suppliers, with the process involving substantial interaction between the two over time rather than a cool detachment.

Furthermore, there is often a clear understanding that the economic well-being of both parties depends substantially upon the relationship. The weighted average duration of relationships with suppliers where there is a technical development activity has been reported as 13 years (Håkansson, 1982) with 70 per cent continuing for more than 5 years, and 29 per cent for more than 15 years. Ford et al. (2002) report that of the top 17 suppliers to vehicle manufacturers, accounting for about 33 per cent of their purchase costs, only two have been supplying for less than 5 years, while 10 have been supplying for more than 15 years. As these figures would indicate, the parties often work together, customers are very active in the exchange and the process of determining and fulfilling the need is an interactive one.

To all intents and purposes, the neoclassical economics notion of markets involving discontinuous transactions between large numbers of buyers and sellers operating relatively anonymously with lots of choice, and on the basis of full information upon which to make such choices, does not hold. Instead, the situation comes closer to what Arndt (1979) has called ‘domesticated markets’, where control is established over the exchange by parties cooperating through negotiated ways of working so that choice is foregone, in the expectation that greater value will accrue to the parties through non-market exchange.

The relationships between retailer Marks and Spencer (M&S) and its suppliers in the UK provide just one clear example for questioning the assumptions that underlie the traditional approach – see Box 3.1.
Marks and Spencer supplier relationships

As a retailer, M&S knows that its ability to add value for its customers comes primarily from the nature of the offerings it can secure from its suppliers, many of whom either produce only for M&S or produce offerings that are unique to M&S. On the food side, it has relationships with suppliers such as Bowyers, a division of Northern Foods, for the supply of prepared cold foods, where it accounts for a large proportion of Bowyers turnover. On the garment side, there are businesses in the UK that have grown over the last 30 years on the strength of their relationship with M&S. M&S was a major customer of companies such as William Baird for men and women’s clothing, Courtaulds for a variety of clothing (leisurewear, swimwear, fitness clothing, knittwear, lingerie and underwear), bed linen and soft furnishings, and Coats Viyella for hosiery. It has even been the sole customer for some companies, including Desmond & Son for items such as men and women’s trousers, pyjamas and leisurewear.

M&S itself plays a substantial role in the exchange value created with its suppliers. As a customer, it is very active indeed. For instance, in its relationship with Bowyers, its food technologists work with Bowyers to come up with recipes specifically for M&S. It plays equally active roles in the relationships it has with its garment manufacturers. Its close relationship with suppliers such as Courtaulds and Coats Viyella over the years had led to innovations such as the non-iron shirt and machine-washable silk sweaters (Christopher and Peck, 2001). The strong relationship with Coats Viyella meant it could also use electronic data interchange (EDI) technology to pioneer the electronic return of daily garment sale numbers from M&S stores, enabling its supplier to dye semi-finished goods overnight to enable next-day replenishment (Oxborrow, 2000), thus ensuring that availability at M&S was second to none.

The strong role M&S has played in its relationships with suppliers and the dedicated production that they have made available over time spawned the soubriquet, ‘the manufacturer without factories’. Of late, of course, with the increasing moves to off-shore sourcing, some of its major suppliers have seen their business with M&S contract or disappear completely. However, those suppliers that remain with M&S continue to work very closely with it, day in, day out.

Matching the Uncertainties and Abilities of Both Parties

Success in business markets comes from the recognition that the customer and marketer together create value in exchange by each providing solutions to each other’s problems. Drawing in part on organizational buying behaviour literature, Håkansson et al. (1976) proposed that a business buyer faces particular kinds of uncertainties either concerning the basis of the need itself, or the nature of changes in the market place, or the transaction associated with meeting the need or each of these. Successful business marketing involves cultivating the ability to reduce these uncertainties.

Customers face uncertainties

*Need uncertainty* relates to the difficulties of knowing exactly what or how much to buy. For example, a customer just may not really know how much
material is required, perhaps because the level of demand from its own customers is highly uncertain. Alternatively, the customer may not be certain as to which materials technology will be most demanded by customers or integrate best with its own manufacturing processes. The lack of knowledge upon which to make a decision is fundamental here and thus need uncertainty is typically higher for new-buy tasks. It is also typically higher when the need itself is more important, so the need uncertainty of a critical component will have higher need uncertainty, as will equipment central to the production of the production.

Market uncertainty arises from the degree of choice a buyer perceives in the supply base and the difficulty in knowing which supply choices to make. The degree of difficulty is a function of how different the alternative suppliers are from each other and how dynamic those differences are. Increased knowledge is the route to reducing the difficulty but comes at a cost: increased time and effort in evaluating the different suppliers before purchase commitments are made. Worse perhaps, when a buyer has made a commitment in a relationship with a supplier it comes with an opportunity cost since there is always the prospect that a better relationship could be had with another supplier, which is precluded by the commitment to the current relationship.

Transaction uncertainty refers to the degree of exposure that the buyer is faced with once a transaction has been agreed. The integrity of a product may be affected in transit, damaging it irreparably or leading to additional delays in fixing the damage, or delivery may be late. For example in high street fashions, where the sales window for a season may only be four to six weeks, a delivery delay of two or three days is significant; the retailer literally cannot sell what is not in the store. Delay problems are particularly significant when coordinated production schedules are involved, such as with JIT systems, so transaction uncertainty would be naturally higher here. The extent of transaction uncertainty is also related to how well the buyer and seller know and communicate with each other. If they and their systems communicate well then the degree of uncertainty is reduced. However, different language, culture and technological infrastructure raise the uncertainty. Standardization of the transaction process should reduce the scope for transaction uncertainty.

Supplier abilities can reduce customer uncertainties

The problem-solving abilities of a supplier in meeting the customer need and/or their ability to transfer the solution create the basis for a successful match as far as the customer is concerned. If a supplier can demonstrate a superior knowledge of the need then it is in the best position it can be. However, this requires a clear customer orientation and a strong recognition that reduced need uncertainty comes from a strong focus on solving the customer’s problems, rather than merely a focus on what the supplier’s
products can do. Further, if a supplier can demonstrate convincingly that it can reduce the customer’s market uncertainty then again it is in the best position it can be. This might actually involve recognizing the difficult choice that the supplier faces and attempting to reduce the extent of the customer’s exposure. This could be achieved, for example, by limiting contract lengths, or by the use of pilot projects or trials. Not only do arrangements like this limit how exposed the buyer is in the first place, they give the supplier the opportunity to demonstrate its transfer ability, reducing transaction uncertainty at the same time.

Customer abilities can reduce supplier uncertainties
As we have indicated, the primary task for the business marketer is to ascertain the nature and extent of the customer’s uncertainties and their own abilities to provide solutions to those uncertainties. While this is already a wider activity than understanding and influencing organizational buying behaviour, there is another dimension to this task that is truly relationship-based. The happy situation for the customer of having their uncertainties reduced does not necessarily reduce uncertainties for the supplier. Ford et al. (1998) indicate that the specific uncertainties faced by suppliers revolve around the capacity that they must plan for (capacity uncertainty) and the sorts of application that the market will demand (application uncertainty). In addition, suppliers are subject to transaction uncertainty in the same way as buyers. As with the customer, the supplier may be subject to none or more uncertainties, to differing degrees, through time. The relative needs and uncertainties of buyers and sellers are presented in Figure 3.1.

What a customer can bring to resolve the uncertainties faced by the supplier are its demand abilities or transfer skills. Historically in the UK, M&S

![Figure 3.1 Matching uncertainties and abilities (Ford et al., 1998:18)]
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has demonstrated strong ability to understand the clothing preferences of British women – an important demand ability and a substantial strength in its relationships with its suppliers. The capacity and application uncertainties of their suppliers diminished with the strong year-on-year stability of M&S demand ability. However, many of the problems M&S has faced within the last five years on the High Street stem from its reduced demand ability. In the competitive womenswear market it has struggled to demonstrate that it has this ability at a time when other stores, most notably Next PLC and international brands such as The Gap, are showing stronger ability in this respect and with equivalent transfer abilities.

The basic tasks then for the business marketer (in conjunction with the business purchaser) are to establish the respective uncertainties and abilities as a prelude to determining the likelihood of the success of their respective value-creating activities. This undoubtedly incorporates an understanding of the organizational buying behaviour of the customer, but extends beyond that.

The need to match uncertainties and abilities in order to achieve business marketing success provides a clear indication that relationships matter (Ford et al., 1998). The relationship constitutes the context within which value-creating activities take place and thus the next level of management activities for both parties involved in the relationship. Consequently, anyone interested in business marketing needs to have a clear understanding of relationships – in order to understand individual customer relationships and what drives them, as well as to understand clearly how to manage such relationships successfully. Knowing what relationships to focus upon, what is possible in such relationships, the resource requirements for initiating changes in any relationship and the implications of such changes upon the relationship, the wider portfolio of customer relationships and beyond are just the sort of concerns that a business marketer must have. It is to the bases of relationships that our attention is now turned.

Relationship Theories and Variables

Relationships between organizations are complex phenomena. Regardless of the size of the organizations, and the number of people involved, there is a range of variables that can characterize a relationship. A wide variety of variables have been used to study relationships and there is no consensus on the set that is necessary and sufficient to explain a relationship. Despite the lack of consensus, however, relationship-based theories provide us with a set of perspectives that can be drawn upon when trying to understand any relationship, each of which tends to emphasize different relationship aspects.

Some of these perspectives more readily explain discrete exchange transactions while others extend the focus across a series of individual transactions to the relationship more broadly. Some emphasize the political and
economic dimensions of relationships, while others focus more upon the social. In one case, a perspective incorporates both a transactional layer and a relationship layer and provides the means by which political, economic and social dimensions can all be located through the interactions that take place in relationships. Table 3.1 lists the various perspectives. As we will see, all have a contribution to make to our understanding of relationships overall. That does not mean that every one provides prescriptive advice for all situations that a firm faces. Rather, depending upon the particular issues in a relationship at particular times, it is possible to draw lessons from whichever perspective has most to offer on that subject.

Exchange risk and its management

All forms of commercial activity involve risk. It is a fact of life. Previously in this chapter we talked about the uncertainties faced by firms. These are sources of risk, and organizations spend much time trying to eradicate uncertainty or reduce their exposure to it. Perception of risk is a function of the possible negative outcomes and the probability of those outcomes arising. There are many sources of risk. For a buying company they might include: late delivery, poor quality, inadequate level of service, unsatisfactory product performance, price increases since order placement or adverse reaction from one’s own management.

In the exchange between two organizations, uncertainties for one party arise from having to rely upon the other to undertake its part in the exchange in a way that delivers the value the first party considers is fair in the exchange. To use simple example: when a supplier acts to make available the goods that have been negotiated with a customer, it is subject to risk until the goods have been paid for and the money safely transferred. Should a customer default before then, despite the recourse to law, the supplier’s business is affected negatively. Similarly, a customer that has negotiated to receive goods of a particular quality, at a particular time, in a particular quantity and at a negotiated price is at risk of any one of these failing to be as expected.

Of course, the parties in relationship exchange may not necessarily react in the same way to the same level of uncertainty because they may have differing attitudes to risk. Indeed, a basic assumption of PrincipalAgent Theory is that there is such a difference and that the parties have different goals in the exchange. This assumption stems from the concern with establishing the contractual basis in agency transactions. The perennial difficulty for a company (principal) that is forced to retain an agent to work on its behalf (for instance, in a foreign market) is that there are unknowns and unknowables. These hidden elements are hidden characteristics of the agent, such as their actual abilities; hidden actions, such as the way in which they undertake the tasks on the principal’s behalf and hidden intentions, such as whether they really have the principal’s interests at heart. These constitute risks that have
### Table 3.1 Key relationship variables

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<tr>
<th>Principal variable(s)</th>
<th>Level of emphasis</th>
<th>Major theoretical source</th>
<th>Theory type</th>
<th>Typical reference sources</th>
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<tbody>
<tr>
<td>Risk and its management</td>
<td>Individual transactions</td>
<td>Principal Agent</td>
<td>Political–</td>
<td>Arrow, 1985; Bergen et al., 1992</td>
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<tr>
<td>Distribution of transaction costs</td>
<td>Individual transactions</td>
<td>Transaction cost</td>
<td>economic</td>
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<tr>
<td>Dependence: power and its exercise; switching costs</td>
<td>Transactions or Relationship</td>
<td>Transaction cost</td>
<td>Economic</td>
<td>Williamson, 1979</td>
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<td>Social embeddedness; trust and commitment</td>
<td>Relationship</td>
<td>Resource</td>
<td>Political</td>
<td>Pfeiffer &amp; Salancik, 1978</td>
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<td></td>
<td></td>
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to be managed. Principal Agent Theory argues that the contract is the basis for the management of the exchange risk because it is through the contract that risk is distributed between the parties. In this respect, it has much to offer the business marketer.

The extent to which the contract is more or less formally stated will depend upon the parties’ attitude to risk within the relationship and their propensity to cooperate. A weakly stated contract and a laissez-faire approach to its operation and enforcement may be as much as is required in some relationships. This approach may be more useful in such relationships where perhaps both parties have a similar attitude to risk, where there is substantial uncertainty and where both parties know that they need to work flexibly, sharing information fully, in order to achieve objectives. The relationship itself brings obligations to the parties (Sako, 1992) without the need for a strongly worded contract. Achieving the objectives in this context is not helped by an overly fastidious attention to the details of the contract and the parties may have sufficient trust that the counterpart will not behave in a way that is obviously self-seeking.

In some relationships it may even be the case that the contract is little more than a gentlemen’s agreement. In other relationships, however, where there is uncertainty and inadequate information, or power asymmetry, or dissimilar attitudes to risk, then more formally stated contracts that are followed to the letter may be the order of the day. The recent case of the relationship between M&S and William Baird paints a salutary lesson in relationship contracts. William Baird took M&S to court claiming damages over the latter’s decision to stop buying from it after 30 years, in contravention of what it saw as an implied contract. The High Court in the UK ruled that M&S was not liable for damages because the fact that M&S had singularly refrained from introducing a formal contract with William Baird with the express purpose of agreeing future dealing indicated that it had no such intention. This (lack of) action itself indicated that there was not agreement between the two as to the relationship. Thus M&S had broken no contract since what had gone before signified no agreement.

Where greater formality is sought in a relationship then several questions need to be borne in mind: when it comes to drafting a contract

- Can performance as stipulated in the contract be stated more or less behaviourally, as a set of specific activities and the way they must be undertaken, or does performance equate to specific outcomes of the activities? Here the distinction is between the ‘what’, that is the purpose of the contract, or the ‘how’, that is the way in which the ‘what’ should be produced. In some exchange situations it is clear what the outcome should be. A physical product such as a component part has clear properties that enable contractual integrity to be established if the component performs to the properties promised in the exchange. In exchanges where the offering is much less tangible, such as in specialist advice or design
services, and the outcome itself is not wholly prescribed there may need to be much greater reliance on behaviour-based contract forms to ensure that contractual integrity is achieved.

- Who controls the contract and thus has greater potential to influence the terms? Essentially, the party with the greater relative power is in the strongest position to specify terms and enforce them. Alongside this question is the related issue of the incentives for the weaker parties to engage in the contract. If the contract is the means by which risk is distributed then attempts to pass greater risk to the weaker party may find that party unwilling to enter an exchange where it feels disadvantaged. Where it does enter the exchange the weaker party is unlikely ever to step outside the confines of the contract; it is more likely to work to the letter of the contract. So, for example, a small architect’s practice working for IKEA in the UK found that it often had to engage in extra design activity as a result of changes initiated by the client. While having a client such as IKEA was a major boon to the practice, and in the early years this accounted for upwards of 30 per cent of turnover in several successive years, the contract rates were such that all the extra design activities were damaging the profitability of the contract. The practice had no alternative but to invoke a Change Request process under the terms of the contract, where all requests had to be approved by the client’s Project Manager and were billed at cost. It had to stick to the letter of the contract in order to ensure it was not adversely affected.

- Even when the basis for the contract is established and the control and engagement issues are dealt with, there are the operational elements to be considered. The nature of the standard operating procedures within the contract may also need to be established. In more formal contracts there needs to be clarity about what is expected from each party, what the specific outcomes are, the relative roles in the contract, and what constitutes acceptable behaviour by the parties. If necessary, there will need to be specific coverage of the procedures for dispute resolution when and if it arises.

Principal Agent Theory tends to place the focus upon the contract and the demands of the current transaction. The issues mentioned above tend to be more salient, with greater uncertainty and inadequate information. The theory has less to tell us when market forces have a greater role in affecting relationships. When there is great market choice then typically there is less uncertainty and sufficient information so that price-based mechanisms deal with the risk.

**Allocating exchange costs**

All transactions incur costs. Bruhn (2003) points to costs arising from initiating, handling, controlling, modifying and terminating contracts, as well as
opportunity costs. Initiation costs incorporate searching, information access and evaluation as well as the efforts in actually reaching a decision, such as negotiation activities. Control costs include monitoring activities to ensure the counterpart is keeping its part of the bargain and extend to the actions required to enforce the bargain in order to remedy any perceived inequity. The levels of these transaction costs are directly linked to the nature of market conditions. In perfect economic market conditions, where everyone has equal access to all information needed for a transaction and where the costs for managing the transaction are the same for all, the mechanism for ensuring the most economically efficient transaction is the open market itself. Here price-based competition will ensure efficient transactions. Of course, when markets are not perfect there is unequal access to information and the costs of managing a transaction are not the same for all possible exchange partners. According to transaction cost theory, the task for companies is to find an exchange partner and a way of working with that partner that creates the most economically efficient transaction possible. That is, the imperative is to establish the sources and nature of transaction costs and to minimize them.

The following three factors affect transaction costs:

- **Uncertainty** concerns the completeness of information. The level of uncertainty can be affected by many factors and extends from general market structure knowledge right down to the specific details of the transaction and what it involves. Where there are unknowns the level of uncertainty is inevitably greater.

- **Asset specificity** is the relative amount of assets or resources that need to be committed specifically to the transaction. There is a range of asset types, including: site assets, brought about by co-location or geographical consolidation; physical assets, such as special tools or equipment required in the transaction; human assets, where unique skills arise as a consequence of the transaction; and other dedicated assets, where particular investments are made at the behest of a particular exchange partner. For example, a manufacturer may need to invest in tooling for the production of designs for a specific customer. Equally, a customer may have to change its own production processes in order to use the inputs from a specific supplier most efficiently. Both of these constitute transaction specific investments.

- The **Frequency** of the transaction has implications for costs because the more often it happens then the greater the transaction costs.

As the level of these three factors rises, so transaction costs rise (Williamson, 1991). The issue becomes what structure should be adopted by the firm to manage the transaction costs. As transaction costs rise the simple market solution becomes less efficient and relationships – so-called ‘bilateral forms of governance’, incorporating cooperation between the exchange parties over the long term – become appropriate. Long-term cooperation should
reduce uncertainty levels. Although levels of asset specificity may rise, this will be considered less risky when doing business with a trusted partner.

It is useful to think about transaction costs in the management of business relationships. They help to explain the diversity of relationships that exist, since the combination of different levels of the three factors above leads to a multitude of unique relationships. Transaction cost analysis helps us to understand how relationships change and develop in response to changing levels of uncertainty, asset specificity and transaction frequency. Firms need to give explicit attention to the level of asset specificity in business relationships.

Dealing with relative power dependence
Dependence is inevitable as a consequence of exchange. Requiring access to the resources held by others creates dependence. Of course, there is dependence on both sides of an exchange: buyers are dependent upon suppliers for the goods they provide, whilst the suppliers are dependent upon the economic value that comes from supplying customers. The issue is the relative extent of dependence since more often than not levels of dependence are asymmetrical. A customer may be relatively more dependent upon a supplier of a critical or scarce resource because the customer’s value-adding activities require that specific resource or because there are few other suppliers. This puts the supplier in a position of strength with respect to the customer. Of course, it can happen the other way round. IKEA has a relative power advantage over its UK architectural service suppliers, for example.

From the point of view of either party to an exchange there a several major tasks that must be undertaken:

- Establish the relative levels of dependence and thus the degree of autonomy of the firm.
- Understand the behavioural consequences of that interdependence, including the potential for the exercise of power. For the stronger party this typically concerns the extent to which it needs to exert its power over the weaker party. If the weaker party is compliant then the stronger party may feel no need to exert explicit dominance. For the weaker party the major concern will be the extent to which the stronger party will seek to dominate the exchange and enforce its will.
- Consider the consequences of actions that may change the levels of relative dependence. This typically revolves around switching costs – the costs incurred by leaving the relationship and establishing a relationship with a new partner.

The social dimensions of relationships
The emphasis thus far in our consideration of relationship variables has been economic. The central role of business relationships is to manage economic
exchange. The general assumption is that the parties to an exchange are essentially self-seeking, seeing exchange as a necessity but seeking to control it. While one cannot ignore the self-seeking view, it must also be said that companies do not always behave completely selfishly. They know that the world does not merely operate at the economic level. Relationships also have a social dimension. They are, after all, social constructions and the parties to exchange exist embedded within a wider social structure (Granovetter, 1985).

This is not to dismiss the economic dimension, nor is it to underplay the inherently selfish motivations that may surround exchange management. However, exchange parties may recognize that their self-interest is best served by cooperation in exchange. That is, it is best achieved when they behave equitably and in the mutual interests of both. The economic value created within the relationship can only be maximized when the two parties cooperate with each other. The social exchange view throws relief upon processes that create equitable conditions. Foremost amongst these are the concepts of trust and commitment:

- **Trust** is seen to be central to a relationship (Young and Wilkinson, 1989; Moorman et al., 1993; Morgan and Hunt 1994), encapsulating the confidence a party has with the reliability and integrity of a counterpart, and building expectations. The reliability and integrity comes from displays, in words as well as deeds (Ganesan, 1994), of consistency, competence, honesty, fairness, helpfulness, responsibility and benevolence (Morgan and Hunt 1994). High levels of trust in a relationship enable the parties to focus on the long-term benefits of the exchange (Ganesan, 1994).

- **Commitment** goes hand-in-hand with trust since it is by a company’s behaviours as manifestations of its commitment that trust can be established and maintained. It is essentially a state of organizational mind or intention, where the relationship has significance for a party and where it wishes it to endure. Morgan and Hunt (1994: 23) characterize commitment as ‘... an exchange partner believing that an ongoing relationship with another is so important as to warrant maximum efforts at maintaining it’. ‘Maximum efforts at maintaining it’ involve clear manifestations of the commitment. This could include financial commitments to show willing, or may involve doing something special for a counterpart that is not available to other counterparts such as product or service customization. In all cases the larger the scale of commitment, the stronger the signal that is communicated.

Social exchange theory makes a clear contribution to our understanding of exchange relationships by showing that factors other than the pure economic may apply and by indicating the role that factors such as trust and commitment play in moderating the impact that power dependency plays in relationships.
Business marketing: an interaction perspective

While the previous perspectives provide an understanding of elements of inter-organizational exchange relationship behaviour, they do not focus attention upon the dynamic processes of interaction over time that are the stuff of relationships between business-to-business companies. Relationships unfold through a whole series of actions and reactions of the parties involved. Managing relationships at the behavioural level necessitates an understanding the processes of interaction so that the consequences of relationship action can be recognized. The Industrial Marketing and Purchasing Group (IMP) Interaction approach (Håkansson, 1982) provides a comprehensive conceptual framework within which to locate a whole host of relationship actions.

- It considers the exchange to embody more than the basic exchange of a market offering for money, extending, as it does, the nature of exchange to cover all forms of interaction between the relationship parties (financial, product, informational and social).
- It adopts a view of exchange that is inherently dyadic, where both parties to the exchange have the potential to act. As Ford et al. (1998) put it, the process of handling company interdependence ‘is not simply about cooperation. It involves the manager working with other companies, but it also involves working against them, through them and often in spite of them’ (p. 1, italics in original).
- It embodies the politico-economic perspective in respect of the structure of power in an exchange relationship while at the same time focusing upon the processes by which the interaction takes place.

The basic tenet of the interaction approach is that enhanced understanding of business-to-business markets is derived from the recognition that the exchange process between companies is not typically characterized by an active seller and a passive buyer. While this state of affairs frequently exists in mass consumer markets, in business markets the buyer may be as active as, or more active than, the seller. Consequently, the exchange ‘process is not one of action and reaction; it is one of interaction’ (Ford, 1997: xi, italics in original). Rather than a large number of individually insignificant customers who are all relatively homogeneous in their needs, customers in business markets come in all sizes with widely differing product/service requirements ‘and marketers seem to talk about them individually so that each seems to be more or less important to the seller’ (Ford, 1997: xi). The relative importance leads to distinctive differences in the ways that a business marketer deals with each customer and therefore relationships can differ substantially.

Some relationships may be complex and long term and bring mutual benefits to the parties, while others may be short term and manifestly dominated by one party. Some may be characterized by trust and cooperation, while others are riddled with conflict and deception. Some may be close while others are more distant. Over time, a single relationship may be characterized
in all these ways, sometimes at the same time. The Interaction Model, proposed by the IMP Group of researchers (Håkansson, 1982; Ford, 1990, 1997, 2001) and based upon their empirical studies (see Error! Reference source not found.), captures the diversity and complexity of the relationships witnessed in business markets. It depicts a relationship in terms of the short-term and long-term interaction process between two organizations and the individuals who represent them. It does this within a wider environmental context and the atmosphere within which the interaction takes place; an atmosphere that affects the interaction on the one hand and is affected by it on the other hand.

The interaction process
The parties in a business-to-business exchange interact with each other. In understanding this interaction over time a distinction can be made between what happens in any individual interaction and what happens at the level of the relationship itself, as an aggregation of and gestalt of these individual interactions (what the IMP Group have termed interaction ‘episodes’). The prevailing aspects of the relationship affect, and are affected by, the individual episodes.

The interaction may be of several types:

- **Product/service.** This is often the reason for exchange in the first place; the relationship builds around this central element. The nature of the product/service offering inevitably affects the interaction between two companies. For those situations where there is a relatively simple customer need for a standard offering, the degree of interaction is likely to be low and type of interaction is likely to be narrow. On the other hand, where there is substantial uncertainty as to the nature of the requirement or the ability of a supplier to provide it, the degree of interaction is likely to be higher and the nature of interaction broader (Håkansson et al., 1976).

- **Financial.** The amount of money involved in the exchange is also likely to affect the interaction. Financial exchange indicates the relative importance of the relationship and thus the imperative for more or less interaction. The interaction may concern anticipated or actual financial exchange.

- **Informational.** It is not always product or money that is exchanged. There is often a large amount of informational contact. For example, technical details may be discussed by research, production or engineering staff from both companies in respect of new product or process initiatives (Cunningham and Homse, 1986). Commercial material such as terms and conditions may be discussed as part of ongoing negotiations between relationship parties. Equally, one party may impart information about planned changes within its organization or its vision for the future of the industry. All of these have no specific reference to money or product/service but are nonetheless important elements of the interaction process. The content of the information and its width and depth, the number of...
Figure 3.2 The IMP Group interaction model of business-to-business marketing. Reproduced from Håkansson, 1982, 24.
people involved in the information exchange, the formality of the process and the use of personal or impersonal communication channels all give an indication of the nature of the relationship between the parties.

- **Social exchange.** This plays an important part in maintaining a relationship between economic transactions and seems particularly important in reducing the uncertainties between parties that come from cultural or geographical distance (Håkansson and Ostberg, 1975). Over time social contacts between relationship participants creates ‘bonds’ between the actors that cements the relationship, building the sort of trust that comes from personal experience of interaction (Håkansson and Snehota, 1995a).

**Relationships**

Interaction episodes over time create a relationship with a history. Each new episode adds to this history such that a relationship assumes an essence that is more than an individual episode. As a result of the elements of interaction above, relationship partners come to know each other better and develop clear expectations of the relative roles and responsibilities of each other. This constitutes a degree of institutionalization; they don’t really have to think about every step they take with each other. An analysis of the contact patterns between the partners that come from the exchange elements above provides an indication of the nature of the relationship: close, distant, cooperative, conflict-ridden, predictable or wildly fluctuating. Furthermore, as a relationship unfolds one or other party may make adaptations in the exchange elements or the process of exchange (Hallén et al., 1991), adaptations that constitute irretrievable investments unique to that relationship.

**The participants in the interaction process**

Obviously, a relationship requires parties to the relationship; without the parties there is no relationship. The parties are the two organizations and the individuals (at least two people) from those organizations. It is the organizations, or more precisely, the individuals, who interact. Consequently, the process of interaction between two firms and the relationship that ensues will depend upon the characteristics of the firms and the individuals themselves. The IMP interaction model posits that the organizational factors include physical characteristics of the firms in terms of size, structure, and technological resource base. They also include less tangible factors such as organizational strategy and the experience of the firms. The model also posits that the personalities, experience and motivations of the individuals working for the firms will also very directly affect the interaction between two firms.

*Size* has a strong bearing upon relative power in a relationship (El-Ansary and Stern, 1972; Stern and Reve, 1980) and, consequently, establishes the pecking order in interaction. The dominant party on the basis of size has greater capacity to call the shots.

The forms of *structure* adopted by the parties and the degree of centralization of authority, formalization and standardization of rules, or levels of...
specialization of jobs, all affect interaction. They do this to the extent that they allow for more or less interaction of different types between people from different levels and departments within the firms. Where structures are heavily centralized, roles strongly ascribed, staff very specialized and procedures always followed, one might expect the levels of interaction to be low and the substance of the interaction to be narrow. Conversely, where there is little centralized control and less formality there is greater likelihood of wider interaction concerning a wider range of subjects.

Interaction brings together the technological resource bases of the two relationship parties and so these bases provide the conditions under which interaction occurs. The technological systems extend beyond equipment-based resources or technology infrastructure. They also include the knowledge bases of the individuals working in the two firms. If the systems match well then the basis for smooth interaction exists. However, if there is a substantial gap between the systems then the basis for smooth interaction is not there. In practice, companies may well get involved in activities to bring their technology systems closer into alignment. For example, a supplier might establish supply capabilities close to a customer’s plant or adopt logistics systems (such as more warehousing and extra delivery vehicles) that ensure continuity of supply (Frazier et al., 1988; O’Neal, 1989a, 1989b). It might even go as far as to deploy staff on a customer’s premises to facilitate a customer’s activities (Wilson, 1996).

In a further example, if the production technology of the seller is geared towards long continuous runs of the same product yet a buyer needs varied, and relatively small, batches of product then interaction between them may revolve around alternative forms of production. Take the case of a supplier of blow-moulded plastic bottles to the food industry and a dairy customer. The supplier had spent a few happy years providing the dairy with its needs for one- and two-pint bottles. The moulds and production testing equipment of the supplier were geared to produce these. The customer sourced its needs for four- and eight-pint bottles from the supplier’s sister plant, which involved greater transport distance. The interaction between the supplier and the customer was heavily affected by the need to source from two separate plants because of the cost implications (for example, greater product mileage and duplication of order processing). The issue was resolved when the supplier added a new moulding machine, new moulds, and product-testing equipment. It could then meet the need for one-, two-, four- and eight-pint bottles, all from the same plant within the vicinity of the customer plant, and could respond more quickly and flexibly to the demand for all of these product variants. As a result the customer felt happy to source its total requirement from the single plant. This is an example of an adaptation involving technological realignment affecting the relationship positively.

What either party seeks to gain overall and, perhaps more importantly, through its relationships affects its interaction. If it sees value through exchange, for instance by joint development of products or sharing of expertise,
then its interaction will follow suit in terms of willingness to engage and the
commitments it may be prepared to make. Where a company perceives that it
can attain its goals independently of a counterpart then this is less likely to lead
it to make substantial commitments to that relationship and its interaction will
be affected accordingly.

The previous relationship experiences of organizations may affect their
propensity to become more or less involved with other relationships. Those
that feel strong commitment to one or several close and deep relationships
has left them exposed financially, or subject to perceived negative behav-
iours from the counterparts, may be less inclined to attain such closeness in
future relationships. At the same time, since relationships require a set of
skills to manage them, those companies that have managed to build the sorts
of relationships that they consider appropriate are likely to feel suitably
equipped for other relationships.

Ultimately, it is the interactions between individual participants that cre-
ate and sustain a relationship. Even when resources such as information or
process technology are shared and underpin a relationship, people are still
involved in bringing these resources to bear and performing the activities
that use the resources. The personalities of these people affect the relation-
ship. Some individuals find it easier to approach new people (a necessary
activity for creating the bonds between people that initiate relationships).
Further, some individuals are more forthcoming than others; again, a trait
that may be appropriate to relationships. This is not to say that relationships
only require extravert personalities. On occasions, the levels of application
and single-mindedness that are characteristic of introverts may be more
appropriate for a relationship. For instance, these traits are likely to be nec-
essary to overcome obstacles in a relationship such as operational fulfilment
problems or to achieve changes in the basis of exchange such as new process
or product development activities. Regardless of the benefit of either set of
traits, the point is that individual personality undoubtedly affects relation-
ships. Individual experiences in general and in relationships in particular
will also affect the way an individual interacts, as will the individual’s moti-
vation to interact. These varied personal characteristics alongside the char-
acteristics of the role the individual fills, the functional affiliation he or she
has, and the level he or she occupies within the organization all affect the
interaction that takes place and thus the relationship that ensues.

The interaction environment
The external environment in which a dyadic relationship unfolds is likely to
affect the behaviour of the firms in the relationship (Achrol et al., 1983).
These effects can be seen in a variety of ways. Market structure affects a rela-
tionship in terms of the availability of and scope for switching to alternative
relationship partners (Anderson and Narus, 1984). Where there are few alter-
atives there is a strong tendency for a company to seek close and stable relations
with a counterpart buyer or seller. Where firms operate in a dynamic
or internationalizing marketplace they may seek to reduce the uncertainty that goes with this dynamism through their supplier or customer relationships. This might involve greater interaction in the form of information or social exchanges.

An individual relationship’s position in the manufacturing channel or the characteristics of the wider social system may also be significant, particularly where the strategies of companies elsewhere in the supply chain are able to influence the behaviour of a firm in that dyadic relationship. A relationship’s ‘embeddedness’ in the network that surrounds it (Håkansson and Snehota, 1995a) creates constraints upon the freedom to act on the part of the relationship parties – something that has been called the ‘burden’ of relationships (Håkansson and Snehota, 1995b).

The atmosphere affecting and affected by the interaction
Interaction over time leads to a relationship that is more than the individual episodes. The relationship is dynamic in that it is affected by the individual episodes. However, the passage of time in the relationship brings a degree of stability. This establishes an atmosphere for the relationship within which relationship participants act. Within the IMP model this atmosphere can be described in terms of the power-dependence relationship between the companies, the degree of cooperation/conflict and the overall closeness/distance in the relationship, as well as in terms of the companies’ mutual expectations.

In a relationship the stronger party has great potential to affect the activities of the weaker party. The strength may come from ownership of resources needed by the other party and/or where the other party is strongly dependent on its counterpart. With power asymmetry comes the potential for conflict, though this depends upon the stronger party exercising the power that its strength brings. If it does use its power in ways that are considered by the weaker party to affect it negatively then this may give rise to conflict when the weaker party objects. The extent to which the weaker party does object depends on how weak/strong it feels; it may just accept there is nothing it can do about it.

While there will always be moments of conflict in a relationship, there may be greater incentive for companies to cooperate (Anderson and Narus, 1990), the self-interest of each party being best served by mutual action (Heide and John, 1990). Parties might act jointly to develop tools and design products (Drozdowski, 1986); to undertake value analysis or cost targeting (Dowst, 1988); to design quality control and delivery systems (Treleven, 1987); and to engage in long-term planning (Spekman, 1988). Inevitably, trust also affects the atmosphere of the relationship. With repeated interaction comes the ability of each party to more strongly ascertain the trustworthiness of its counterpart and for trust to affect the atmosphere of the relationship.
The IMP interaction model: criticisms and lessons

Whilst the IMP interaction model has been acknowledged for its contribution to the understanding of inter-firm relationships, there have been some criticisms of it. Theory is often developed from individual examples such that law-like generalizations are not readily derived. This means that there is a lengthy list of concepts (Seyed Mohamed and Wilson, 1989) and these concepts can lack clarity or overlap (such as with adaptation and adaptation processes (Brennan and Turnbull, 1995)). Criticisms are not generally levelled at the central proposition that the relationship is central to the understanding of business marketing.

The IMP interaction model captures the various elements that may affect the relationship interaction process in the short- and long-term as well as clearly showing that the interaction itself may affect the parties to the relationship, either directly or through the atmosphere surrounding the relationship. In this way, organizations adapt to the relationships they have, and as a result may be changed. When it comes to drawing from the model to help with the management of relationships there are several preliminary points that must be made:

- Relationships are two-way. Even if one party is dominant and can obtain its own way, the fact that it has to use the resources provided by another means that there is still an interactive process unfolding and the relationship is the outcome of the interactions between the two. This means that managers need to consider the aspirations, potential and behaviour of both parties to the exchange if they want to obtain clarity about the way the relationship is and could be.

- Relationships in general are complex and can be described using a multitude of variables, some of which may be of more explanatory use in some relationships than others. In one relationship it might be the power a supplier has over a customer on the basis of its provision of a scarce resource that explains much of the interaction in the relationship. In another, the common history and levels of trust between the partners over time might explain it better. In yet another, despite a history of cooperation, changes in the wider marketing environment may drive impending changes in the relationship. The situational diversity and the range of variables that could explain any individual relationship mean that simple prescriptions for action are not easy to obtain. Rather, managers have to reflect upon the relationship that confronts them, understanding its entirety in its natural setting. Only from that understanding, aided by the analytical tools that this book provides, will sensible development of the relationship result.

- Whether a relationship is long term or short term, at any particular point there is a history leading to that point. The history both makes it what it is and sets the jumping-off point for the future. Understanding the
history of a relationship is a prerequisite for establishing what it can be in the future.

Business Marketing as Network Analysis and Management

Beyond relationships to the network
Relationships are the primary basis for exchange, and are thus central to business marketing. It is through relationships that companies achieve objectives. However, the decisions taken in relationships and their motivations do not necessarily originate at the level of the relationship (Ford and McDowell, 2001). Often for the business marketing organization there are considerations that extend across the whole portfolio of customer relationships in which it is involved. How it behaves within any one relationship will be conditioned by these other relationships. Further, how it behaves in any one relationship will be conditioned not just by its customer relationships at large, but potentially by its own supply relationships; it may be affected by the links that its suppliers have with their suppliers. Beyond that, it may even be affected by the links with other agencies, governments, banks, universities and industry associations. All of these have the potential to affect the single relationship because of ‘connectedness’ (Cook and Emerson, 1978) – all of these relationships are connected to the wider network within which they are ‘embedded’ (Granovetter, 1985). As Ford et al. (2002: 29) argue, ‘This network is the arena in which the business marketer must operate. The relationships in the network enable the company to grow and develop, but they are also a constraint on that development and may restrict its activities’.

This points to the fundamental issue for the firm, surrounded as it is by a network of relationships, that its relative value strategically is a function of its position in the network. This requires a different strategic mindset from the traditional one that sees the firm as atomistic, independently deciding upon its own strategic future and having the freedom to pursue that course. The network view means that it has to accept that it is interdependent and embedded, and that this limits both its ability to think and act independently. Thus, the task for the firm, managerially, is to analyse the network in order to establish its network position and engage in relationship behaviour that will enhance that position. This will inevitably involve acting within existing relationships in ways that may achieve this. It might also involve activities aimed at forging new relationships.

Network analysis to establish current position
Given the complexity of individual relationships that we have depicted in the previous section, managers or practitioners would find the application of an analytical framework such as the interaction model in its entirety overly
cumbersome. In any event, that level of analysis is unnecessary to obtain some knowledge of the relative positioning of firms in a network. Rather, it is possible to employ the sort of shorthand analysis that Håkansson and Snehota (1995a) have used to great effect. This analysis recognizes that there are three important components that networks bring together from all those organizations within the network: what Hakansson and Snehota call the substance of relationships. The three components are the actors who engage in relationship behaviour, the resources that are created or used in relationships, and the activities that are undertaken in relationships. To distinguish the different kinds of interconnection, while at the same time recognizing that they are relational, they are referred to in terms of actor bonds, resource ties and activity links – which is why the activity of examining each of these can be called *ARA Analysis*.

**Actor bonds**

It is people within organizations who initiate relationships and typically create and control resources and activities, and it is often easiest to start with an identification of as many companies and people within them that have connections with other actors in the network. The nature of the connections may be economic or social. It is also easiest to start with one’s own organization and work out from there.

**Activity links**

Relationships start operating to achieve their purpose when activities are undertaken that deliver that purpose, whether it is design activity from a supplier or requests for information from a customer. Typically, an activity cycle between two companies would commence with an order and end when it is delivered. However, depending upon the nature of a relationship it may be that other activities are worthy of note in a network diagram, such as a joint research project or combined promotional activity. The consequence of mapping the links between the parties in the network is an indication of the range of activities that are taking place and the relative role that the focal company has in this.

**Resource Ties**

Resources are used to undertake activities by actors, but may also be created as part of the relationship exchange. The resources may be used by actors on their own (such as equipment within their own firms required to perform specific tasks) or may be combined with the resources from other parties to create a shared resource. IT makes the sharing of data resources increasingly easier for companies. So, for instance, there may be design inputs from a variety of network actors making use of a shared design system.
By establishing the variety of linkages between the firms in a network in terms of these types of interconnection it becomes possible for a focal company to establish where the critical mass in terms of the ARA components lies. This then enables it to determine where it lies in relation to others in the network in positional terms, whether it has a strong presence and is central to the direction things are going, or whether it is relatively weakly joined and on the periphery of network developments.

**Initiating changes towards a new network position**

On the basis of the analysis of network position, a focal company is better able to consider how it changes network position. This is likely to involve it in attempts to forge stronger relationships with partners that are in stronger network positions, or may lead it to wind down or forsake some of the relationship linkages that it already has. This may seem obvious: to get stronger it just involves forging relationships with positionally strong actors. That is, move from the periphery to a position closer to the centre. However, in examining their own network positions, stronger network parties are unlikely to welcome relationship advances from any party that does not maintain or further enhance their existing positions. Furthermore, stronger network players are likely to be highly sought after. However, in the pharmaceutical or biotechnology sectors, for example, some smaller players can certainly do this if they bring forward a new drug or treatment platform.

Parties to exchange also need to be aware of the costs of attempting to forge lots of relationships. First of all, relationships are not free and as with any investment decision the firm needs to be sure it will obtain value for the not inconsiderable costs it will incur. At the same time there is also a level beyond which it becomes cognitively difficult to consider the links with counterparts and have clarity about what is obtainable from those relationships.

More often network positional change has to be achieved more gradually using existing relationships to forge the sort of actor bonds, activity links and resource ties that will strengthen the parties involved. Furthermore, by acting with a relationship partner, or a chain of partners, it becomes possible to exert greater change in position than acting alone. Indeed, an important asset of network thinking is that achieving an improved positioning may not actually involve specific actions on the part of the focal party. Rather, it may involve encouraging changes in another network party or parties for the benefit of both it and the focal company. For instance, by encouraging a supplier to innovate with new materials technology it becomes possible that the value-adding activity of the focal company is enhanced with its customers, making the network positions for both focal company and supplier improved.
Chapter Summary

• As well as an understanding of the behaviour of the buying company, business marketers also have to understand the relationship between the buying company and the selling company.

• Relationships are two-sided: treating customers as passive recipients of the attentions of the marketer is a naive view of business marketing and inherently flawed.

• Any ability a marketer has to influence the buyer is predicated on the nature of the relationship between the two parties and so must involve a clear understanding of what is possible within the relationship. This means that rather than being solely preoccupied with the buying centre the marketer must analyze the relationship at large.

• A variety of theoretical viewpoints can be drawn upon to understand a relationship. However, it doesn’t matter which perspective the marketer draws from, so long as by doing so a clear understanding of what is happening in the relationship is derived. Decisions about the future of a relationship can only come about from such an understanding.

• The business marketer strives for deep understanding of the current state of the relationship, of its likely future development and of the process of value creation within the relationship.

• Success in any individual relationship will depend upon the business marketer’s understanding of that relationship within the wider network of relationships within which the company is embedded. Strategic business marketing focuses on a clear understanding of the network and on creating individual relationship strategies that establish the most favourable network position for the company.

Questions for discussion

1. Why is an understanding of the buying behaviour of the customer insufficient for successful business marketing?

2. Explain the uncertainties and abilities that buyers and sellers bring to an exchange situation.
3. Explain how principal agent theory can help our understanding of exchange risk.
4. Identify the three factors that affect the level of transaction costs and how they do so.
5. Why doesn’t a stronger exchange partner always exercise its power?
6. To what extent are parties to exchange only concerned with economic value?
7. What are the four main elements of the IMP interaction model? What has it got to offer that other perspectives may not?
8. Why does a business marketer need to have a network view?

Case study: Surface inspection – ensuring quality, tile after tile after tile

As with many lifestyle furnishing products, people demand more and more choice from ceramic tiles. Floor tiles and wall tiles both now come in an increasing range of colours and styles to cater for these diverse customer tastes. Of course, when their selections are splashed across their wall or on their floor, they expect uniformity of pattern, colour and texture. They certainly don’t want marked variations in colour, blemishes or apparent flaws. Maintaining consistency of quality in tiles has traditionally been difficult and has typically relied upon human checking. Of course operationally this has implications for throughput rates, which has meant that the process is only as fast as the speed at which one or more quality inspectors have been able to work.

With greater complexity in tile design, and a wider range of colours being used in any single tile, human checking gets even slower; the quality of checking also deteriorates because the task gets more difficult and attention can only be maintained by inspectors for short periods of time. Change in the prevailing light conditions also has an effect.

Tile batch production itself has been increasingly mechanized over the years, with manufacturing lines incorporating pressing, drying, glazing and decorating processes before tiles get fired in the kiln. The ability to remove flawed tiles at the earliest point possible is desirable. This reduces the costs incurred in glazing a tile biscuit that has a problem, or decorating a tile where there are glaze deficiencies, or firing a tile that will be later rejected or marked as second or third quality at best. It also ensures that the kiln is used to fire a greater number of first-quality tiles. Some of the tile manufacturers are large internationally known companies (Dal Tile, Graniti Fiandre, H&R
Johnson, Interceramic, Pilkingtons, Porcelanosa, Villeroy & Boch) that have invested heavily in capacity where the benefits of investment cannot be achieved if the process faces discontinuities with quality checking.

Thus, inevitably, attention in the industry has turned to the use of technology to undertake tile inspection, the great bottleneck in production. Technology has the potential to enable inspection at tolerances that were hitherto not possible and to achieve greater consistency in quality, tile after tile after tile. And, of course, the technology can work 24/7, if required, and doesn’t need a tea break. While production occurs in many locations, Spain and Italy continue to be the largest exporters of manufactured tiles, with the areas around Sassuolo in Italy and Castellón, Spain, being the source of much of the world’s production.

Surface Inspection in the UK is a world leader in automatic, visual tile inspection technology, with over 350 systems installed with companies in Europe and the Americas and with over 40 per cent of that being repeat business. Its Master Series equipment, incorporating a ProcessMaster® and FlawMaster® can handle checking at various stages of the tile production process (see Figure 3.3) in order to remove sub-standard tiles at the earliest (and thus most cost effective) opportunity. The current range of Surface Inspection machines can provide a throughput of 750 m/hour and can handle tiles up to 600 mm x 1200 mm. Efforts are continuing to increase the rate further and the complexity of tiles that can be checked reliably.

The £6.5 million turnover company, with its staff of 60 people, only undertakes the design and assembly of the machines, relying then upon the expertise of several suppliers with whom it works closely in making the various components (conveyors, lighting, camera equipment, processors, machine casing and so on). The relationship with the provider of the camera equipment is particularly important and Surface Inspection is very protective of the intellectual property created by their close relationship. Surface Inspection completes the product development process by assembling the machine at its Bristol location in the UK before shipping to customers. When
the machine is in place, the Surface Inspection engineers install the necessary software, incorporating its protected analysis algorithms, and fine tune for the local conditions. These local conditions vary enormously but the tile production environment is generally quite a hostile one, with lots of variations in heat and dust in the manufacturing plants.

Surface Inspection considers it has benefited substantially from its contacts with the industry itself when it comes to product development activity. In the early days, when the technology was developing, a German customer that had faith in their visual inspection approach allowed the company to put machines into their production line while they perfected them, enabling software debugging to be undertaken and re-specification of the mechanical performance of the equipment. Similar contacts with a nearby UK customer allowed ready access to production testing facilities. On the basis of a long-term loan of a machine to this customer, it can secure access to a test rig at short notice in a real production environment. This same customer had sufficient faith in the Surface Inspection solution to take an equity stake in the company in its early days. Its reward has been a 6 per cent increase in first-quality tiles.

In an overall market estimated to be worth 95 million in 2003, it is understandable that competition for inspection internationally would be on the increase. However, while there have been a lot of entrants to the market over the 17 years that Surface Inspection has been on the scene, the number of firmly established players in the market has not increased substantially (from four in 1987 to five major players currently). These major competitors include another UK company, Axiom, a company from Germany, Massen, and two companies from Italy, System and Italvision. While these companies also undertake automatic visual inspection of ceramic tiles, they may have interests in other industries as well. System of Italy provides process control equipment more generally, and storage and handling equipment for the logistics sector, as well as a range of equipment for the tile production process (handling, decorating, selection line, palletizing and storage). Massen uses its machine vision technology in the automotive, textile, and flexible circuit board sectors as well as ceramics, and for more general applications such as sorting and in-line measurement.

Like Surface Inspection, some of the competitors have been refining their technology through successive upgrades of their installed systems. This enables them to build upon the knowledge that is gleaned from machines having to work continuously in the harsh environment of tile manufacturing facilities where they have to cope with the effects of heat, noise and dust. Other companies are more recent entrants, seeking to prove themselves and their technology. In some cases the technology has emerged from the development activities of a variety of players working together. For example, an Italian company, Examina, recently came about as a result of EU research programmes involving the collaboration of a variety of parties, including:
• tile manufacturers (Ceramiche Atlas Concorde of Italy and EmilCeramica of Italy);
• specialist research institutes (Istituto di Elaborazione della Informazione (IEI), Italy – image processing for quality control expertise); and
• software companies (Macs Tech, Italy – neural networks and vision technology, system integration and project management; and Cromemco, Germany – parallel computing specialists).

The company claims that its system is able to process 30 × 30cm tiles in less than 300 ms, allowing a line speed up to 60 metres per minute. Whether it will manage to establish a presence in the market remains to be seen.

Surface Inspection itself has benefited from its own product collaborations in the past. A development project with a Spanish customer (Errece) has led to the creation of an integrated Selection Line product that can inspect and then separately stack and pack tiles of different quality (SelectMaster®). It is also currently working in a research consortium incorporating 13 EU partners from six countries, straddling industry and academia (Monotone) to improve production in the ceramic tile industry in the EU. While the EU (with Italy and Spain) currently leads in production of tiles, China and Brazil are narrowing the gap very quickly. The project started in 2000 and aims to improve quality (especially colour tones) and reduce waste in order to prevent the gap narrowing.

Given the leaps that are being made by the competition, the development required to stay ahead of the game may necessitate further collaboration for Surface Inspection and it may mean that it has to develop closer relationships than it has up to now. This includes being able to decide who to collaborate with, in which projects, and how deeply to become involved.

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Case Study Questions

1. Why do relationships increasingly matter in this marketplace?
2. Attempt to depict the network for tile surface inspection and evaluate the network position of Surface Inspection.
3. Using the ARA analytical model described in the text, recommend some changes for Surface Inspection that will further enhance its network position.
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