

CHAPTER 4

Other theories of the firm

4.1 Learning objectives

The main objectives of this chapter are:

- ◆ To introduce theories of the firm that have emerged from the criticisms of the neoclassical theory
- ◆ To suggest strengths and weaknesses in these theories, and
- ◆ To provide examples of the application of these theories

4.2 Behavioural theory of the firm

The ideas of Herbert Simon were important in the emergence of behaviourism.¹ Central to these ideas was a critique of the assumption of rationality that underlay – and still underlies – neoclassical economics (March and Simon, 1958; Simon, 1960). Simon introduced the notion of *bounded rationality*. Under limited, or bounded, rationality it is accepted that decision makers in firms – and, more generally, in organizations – cannot have perfect knowledge about all the possible options and their outcomes. In neoclassical theory, such perfect knowledge is essential in order to choose the best option, that which is optimal – for firms, the one that maximises profits. A decision taken with bounded rationality arrives at an option that satisfies knowable, identifiable, criteria. These might be, for example, cost or time based. Other options may also satisfy these criteria, but because there is no way of knowing which of these options is best, the first such option is chosen. This is closely related to Simon's notion of *satisficing* – of making decisions that are satisfactory rather than

spending large amounts of time and money to obtain information on more and more options and their outcomes. What makes the decision satisfactory is that it is consistent with some or other rule or norm; in practice managers use 'rules of thumb', rough rules of behaviour that have been seen to work in the past.

Following – and building on – his work with Simon, March collaborated with Cyert on what became a classic and much-quoted text, *A Behavioural Theory of the Firm* (Cyert and March, 1963). This work is close both in time and in treatment of key issues, to the managerial theories discussed in the previous chapter. The similarity between behavioural theory and the managerial theories is in the idea that the firm has multiple objectives, driven by different constituencies, constrained in various ways by external factors. As we saw in Chapter 3, the multiple objectives in the case of managerial theories are those of owners and managers, and the external constraints are mainly those of the various markets. The managerial theories are thus in a sense special cases of the behavioural theory.

The behavioural theory views the firm as a coalition. Among the members of this coalition are managers, workers, shareholders, customers, suppliers, bankers and any others with an interest in the firm. They may have different or even conflicting interests in the firm. Increased wages for workers are, at least in the short run, at the expense of profits for shareholders, for example. For the coalition to survive, there have to be compromises. And for compromises to be arrived at, there has to be some kind of bargaining process in which the demands of each of the members of the coalition are defined. This process is at the heart of decision making in the firm.

It is here that bounded rationality enters the picture. All the members of the coalition have some, perhaps different, notion of what would be a satisfactory outcome. Each is only a satisficing objective because the members are boundedly rational and because of the cost of obtaining the information necessary to identify a more optimal outcome. The choice of options, for the survival of the coalition, must be based as much as possible on achieving the range of satisfactory outcomes defined by the different constituencies. This choice of option is, thus, not a maximization of anything. It is, rather, the result of aiming to achieve multiple objectives in the face of multiple constraints. The example above of wages and profits is appropriate here. There are many other objectives; managers and workers in different sections of the firm, would aim to achieve improved performance in their own sections. For managers and sales staff, for example, sales and revenue growth would be the objective, for production workers, output growth. Each of these objectives might be achievable only at the expense of one of the other objectives. The theory suggests that *organizational slack* is necessary to solve the conflicts that arise as a consequence of conflicting objectives.

Organizational slack refers to what at first might seem to be inefficiency. A firm might be able to cut costs to significantly below current levels. However, the difference between the current levels and the 'efficient' levels may be necessary to enable the firm to maintain its coalition of interests. In the example of wages and profits, it may be necessary to pay skilled workers out of this difference between current and 'efficient' levels, in order to keep them

‘on board’, without reducing profits. Organizational slack can thus be used to achieve a particular objective without preventing the firm from achieving its other objectives.

That organizational slack exists in many organizations is clear, though the basis of this slack is not always seen as consistent with that suggested in behavioural theory. Principal–agent theory, as we saw in the previous chapter, interprets underperformance of a company as moral hazard. Managers shirk their responsibilities under their contracts and this results in suboptimal performance. Organizational slack in this view of the firm will result, if there is an efficient market for corporate control, in the firm being taken over by different major shareholders with a more effective management team. In the behavioural view, organizational slack has a positive function of ameliorating problems arising from conflicting objectives.

Given the cogency of its critique of neoclassical theory, and the success of many of its proponents (Simon was awarded the Nobel Prize for Economics in 1978), it is interesting to ask about the extent to which behavioural theory has impinged on the mainstream theory of the firm. Stigler’s (1961) seminal contribution to the ‘economics of information’ introduces into the neoclassical framework, bounded rationality and the search behaviour that leads to decision making in the firm. The marginalist solution, as he shows, is for search to continue up to the point where the cost of additional search (marginal cost) is just equal to the returns – in terms of improved performance – from the additional search (marginal revenue). Simon refuted this, stating that it requires that management have some idea of the returns from additional search, and, given bounded rationality, they in practice could not know this. As with other applications of neoclassical theory, a reply to Simon could be that the decision makers need not know MC and MR; it is a *post hoc* explanation for what must have happened for the firm to be profit maximizing. This reply, however, emphasizes the limits of neoclassical theory, suggesting that it has no value as a prescriptive aid to management.

Other neoclassical economists rejected the idea of bounded rationality on the grounds that ‘the assumption of economic man gave a sufficiently accurate account of human behaviour to allow predictions to be made in the aggregate’ (Butler, 2002). This criticism from the neoclassical mainstream is one reason why behaviourism has had a limited impact in economics. Another is clearly expressed by Kay, writing about theories that ‘described facets of business behaviour that were ignored by conventional models. If their impact on mainstream business economics was modest, this was because they failed to generate the clear-cut predictions and prescriptions associated with the assumptions of profit maximization and perfect competition’ (Kay, 2002). There is an interesting contrast here, in that, as we have just argued, despite its precision neoclassical theory’s weakness may be in its inability to provide prescriptive aid to management. At the same time, theories and arguments, like many of those in behavioural theory, that are not amenable to mathematical precision are unlikely to be incorporated into neoclassical economics, the main tools of which are mathematical.

4.3 Stakeholder theory

In some ways similar to behavioural theory, stakeholder theory also focuses on the interests of all the participants in the firm, and on how those interests can best be met. It is different from behavioural theory in that it does not explicitly adopt concepts such as bounded rationality and satisficing. Many versions of stakeholder theory are more about politics, polemics and ethics than they are about economics (Jones, 1995; O'Sullivan, 2000, p. 52).

The stakeholder view argues that the firm will perform better by being concerned with the interests of all the stakeholders than by being concerned exclusively with the interests of the shareholders. Stakeholders include all those working in the firm (insiders), and those others such as suppliers, customers, creditors, shareholders, government and the local community (outsiders), who are affected in some way by the actions of the firm.

There are a number of reasons why the stakeholder firm is expected to perform better than a firm run by a management more directly focused on shareholder value and profit maximization. Among these are the following:

- ◆ The stakeholders see themselves as part of the team that makes up the firm. Their closer association with the firm results in more personal benefit from the performance of the firm than in more conventional situations. They will therefore put in more effort to achieve better performance.
- ◆ As part of a team, stakeholders also have a reluctance to let down other members of the team. Because of their loyalty to the firm they will not shirk any of their responsibilities.
- ◆ Co-operative behaviour will improve performance. To borrow from behavioural theory, there is no need for organizational slack as there will be more agreement and less need to compensate one group in return for allowing another group's objective to be achieved.
- ◆ The stakeholder firm is more likely to engender trust among the participants. As will be shown in Section 4.5 below, where there are high levels of trust, there is less opportunistic behaviour – less exploitation of weaknesses in contracts. Opportunistic behaviour is costly, and its exclusion or reduction is another possible advantage of stakeholder firms.
- ◆ Aiming to achieve objectives other than those of the shareholders leads to less short-termism. A narrow concern for the share price of a firm can result in a long-term decline in performance (see above, Section 3.2.2).

One of the difficulties in testing whether the stakeholder firm does in fact perform better than the shareholder firm is definitional. What exactly is a stakeholder firm? Moschandreas (2000, p. 197) makes clear that all firms 'consider the interests of all stakeholders'. However, the shareholder firm does so as a means to an end, that end being the maximization of profit and shareholder value. The objective is profit maximisation subject to constraints, those constraints including the interests of the other stakeholders. The objec-

tive of the stakeholder firm, on the other hand, is to advance the interests of all the stakeholders. Moschandreas shows that there is no consensus as to precisely how this is to be achieved, however. For Aoki (1988), stakeholder firms have an overall objective of value added maximization. This is similar to Blair's (1995, cited in O'Sullivan, 2000) contention that stakeholder firms should be assessed in the context of the objective of corporations, namely to create wealth for society.

Rather than adding value or creating wealth, Moschandreas (2000, p. 97) emphasizes that 'stakeholding behaviour is expected to lead to enhanced competitive advantage through behaviour which is "inclusive" and socially efficient. . . . Stakeholding objectives must . . . be expressed in terms of both the creation of surplus and its distribution among the stakeholders'. This leads to the short-term objective of maximization of surplus and its fair distribution among stakeholders, and the long-term objective of stability and corporate viability.

O'Sullivan's (2000, pp. 52–8) critique of stakeholder theory rests on what is meant by fair distribution of the surplus. In Blair's (1995) analysis, institutional reforms are necessary to ensure that there are adequate incentives for stakeholders to invest in firm-specific assets (for example, for workers to invest time and effort in obtaining firm-specific skills). Blair's focus remains – similar to that of neoclassical theory – returns on investment. For O'Sullivan (2000, p. 56), Blair

fails to go beyond the neoclassical preoccupation with static resource allocation. The returns to all participants (productive factors) in the enterprise – in such forms as wages, rent, and interest – remain strictly determined, as they are in the neoclassical model, by technological and market forces that are external to the operation of the enterprise and human control more generally.

What is missing from stakeholder theory, in O'Sullivan's view, is the relationship between firm specificity and innovation.

Accepting that there are differences in what is meant by the stakeholder firm, and that there are critiques of stakeholding both from neoclassical and anti-neoclassical perspectives, is there any evidence about whether stakeholding enhances performance? There is at least evidence of lack of co-operation leading to corporate failure. Dertouzas *et al.* (1989) found 'a lack of cooperation between individuals, between groups of individuals within firms, between firms and their suppliers or their customers, between firms in the same industry and between firms and government' to be key factors in the failure of firms (Moschandreas, 2000, p. 198). The opposite was the case – high levels of co-operation – in best practice firms. Further indirect evidence is provided by Appleyard (2001). She shows both theoretically and through case-based example that a close relationship between buyer and supplier firms is important in the successful implementation in the buyer's processes of a tool provided by the supplier.

Finally, the question arises as to whether, assuming co-operation and stakeholding are advantageous, their introduction can be left to the market. We refer here to three different

arguments. First, Freeman and Phillips (1999) have a libertarian perspective on stakeholding which, though favouring stakeholding, broadly opposes government regulation to support stakeholding. Second, providing evidence against stakeholding and related transparency, Almazan *et al.* (2003) seem to provide the basis for an argument in favour of regulation. Using a theoretical model, backed by anecdotal evidence, they show that the transparency associated with stakeholding can reduce the value of the firm. Moreover, as a result of this negative implication of transparency, the incentive for 'firms and stakeholders to undertake relationship specific investments' is reduced. More conservative capital structures are preferred. What is particularly interesting in this paper is that in opting for this conservative capital structure the firm forgoes advantageous investments ('positive NPV investments'). Arguably, regulation is necessary to offset the transparency effects and encourage firms to adopt the advantageous investments. Third, in the context of increasing globalization, and the consequential distancing and fragmenting of stakeholder groups, it is unlikely that a stakeholder approach will be adopted on a voluntary basis. As Moschandreas (2000) concludes, referring to Maltby and Wilkinson (1998), 'governments should create mechanisms to promote socially responsible behaviour'.

4.4 Co-operative game theory

Not among established theories, but clearly related to stakeholder theory in content and to principal-agent theory in methodology, Aoki has developed the co-operative game theory of the firm which sees the firm as a coalition of various parties (Aoki, 1984).

As argued by Aoki, the firm can serve 'as a nexus for co-operative relationships between the employees and the shareholders which makes possible the optimal redistribution of risk as well as the efficient collective use of skills, knowledge, and funds' (Aoki, 1984, p. 56).² Strongly opposed to the managerial conception where the objective of the firm is identified with the objective of one of its separate constituents, the idea of a 'nexus of co-operative relationships' provides a link between the various units forming the firm. The behaviour of the firm on the market emerges from this nexus; this behaviour is a co-operative game solution called the 'organizational equilibrium' (*ibid.*, p. 69).

This 'coalitional view' disregards, reluctantly, other potential players. Financial institutions, supplying capital to the firm, customers and suppliers, interacting closely with it, and other firms, in competition with it, are all potentially influential players. Although they all lie outside the boundaries of the firm itself – except in the case where some of the employees are also shareholders and customers of the firm – their actions do matter for the determination of the co-operative game solution. Aoki acknowledges in particular among these outsiders, his omission of the role of the customers of the firm. More importantly, from the point of view of his analysis, he also acknowledges the omission of the 'Schumpeterian entrepreneurial role' of the manager (Aoki, 1984, p. 196).

Recent developments of aspects of co-operative game theory have focused on consultancy

and direct advice on business strategy. Nalebuff and Brandenburger (1997), for example, have written about 'co-opetition'. The book's two subtitles provide apt descriptions of its content: 'A revolutionary mindset that combines competition and cooperation' and 'The game theory strategy that's changing the game of business'. They are explicit about the extent to which, rather than competing in a zero sum world, in many instances firms stand to gain from co-operating with others. The gains of other firms are not necessarily at a cost to the firm in question. In another such example, Groot Bruinderink *et al.* (2003) write of the consultancy firm Arthur D. Little's 'development of stable coalitions' (DOSC) approach. This, they write, is 'based upon the principles of "Cooperative Game Theory"'. It is 'particularly useful for analysing potential partners prior to entering negotiations, and for obtaining a stable and reasonable share of the gains from the intended partnership.'

Non-cooperative game theory (see Chapter 2) is much more common in IO. It is, indeed, regarded as a 'characteristic feature' of what came to be known in the 1980s as the 'new IO' (see Davies and Lyons, 1988, p. 7). Focusing on the strategies of rival firms, it is concerned primarily with the external environment of the firm and less with its internal coalitional nature.

4.5 Transaction cost theory

In stakeholder theory it could be argued that firms exist to enhance the interests of the stakeholders. In transaction cost theory, firms exist to minimize transaction costs. To explain transaction cost we introduce the notion of *property rights*. Rights of ownership (or property rights) to a good or service must be able to be established before a market for that good or service can exist. In an as yet relatively clean-air world, for example, property rights over breathable air cannot be established and no market in this good exists. Transaction costs 'are those incurred in enforcing property rights, locating trading partners, and actually carrying out the transaction' (Hyman, 1992, p. 134). If property rights over a good cannot be established, then transaction cost theory is inappropriate. This definition is particularly apt for contracts in which a good is changing hands. In other contracts, for example where a firm subcontracts another to carry out some operation or provide a service, there may be an ongoing need to ensure that the terms of the contract are being fulfilled. A more complete list of transaction costs would include not just the search and information costs, bargaining and negotiation costs, and measurement and implementation costs, but also monitoring and enforcement costs (Pitelis, 2002).

Work incorporating transaction cost theory has been applied to such issues as the absorption of risk in subcontracting by the Japanese car industry (Asanuma and Kikutani, 1992), problems in the transformation of institutions in the post-Communist period in eastern Europe (Iwanek, 1992; Williamson, 1992) and the design of policies to encourage research and development (R&D) given the problems related to the low appropriability of the results

of R&D (Itoh et al., 1991). Transaction cost theory also has considerable potential to influence the formation and application of competition law (Pitelis, 2002).

Originally a rather narrow, minority-interest specialism within IO, the work of Coase and his followers has thus clearly become a major concern of the discipline. In the title of his speech on receipt of the 1991 Nobel Prize for Economics, Coase called this work ‘the institutional structure of production’ (see Coase, 1992). In this speech, Coase was critical of the continuing tendency among some theorists of the firm to ignore the fact that ‘the efficiency of the economic system depends to a very considerable extent on how these firms conduct their affairs’. He was even more surprised at the ‘neglect of the market or more specifically the institutional arrangements which govern the process of exchange’. He was pleased to acknowledge, however, that institutional factors were beginning to be introduced into mainstream economics (1992, p. 714).

What have Coase’s contributions been, and how have they been developed in recent years? His seminal article ‘The nature of the firm’ (1937) argued that it is due to the existence of transaction costs that firms exist. If it is through the market mechanism that prices determine how factors of production are to be combined to produce what goods, for what markets, then why are organizations necessary? Coase’s answer is that where transactions between individuals would be too difficult, inefficient or expensive, such that an organization could co-ordinate them at a lower cost than if they were market transactions, then firms emerge to do this co-ordination and thereby, in a sense, obviate these transactions by internalizing them. In general, ‘if the costs of making an exchange are greater than the gains which that exchange would bring, that exchange would not take place and the greater production that would flow from specialization would not be realized’ (Coase, 1992, p. 716).

The internalization of transactions enables the exploitation of economies of scale or of scope.³ The extent to which economies of scale can be exploited determines the size of a firm. Under what circumstances will transaction costs be lower when internalized than when left to be negotiated in an external market? This is among the questions asked by Williamson (1985), whose ‘many significant insights’ have given ‘substance to Coase’s suggestion that firms reduce transaction costs’ (Alchian and Woodward, 1988, p. 65).

Williamson focuses on *bounded rationality* and *opportunism*, and *asset specificity*, in his study of economic organization. Bounded rationality refers to the imperfect ability to solve complex problems. In a game like chess, for example, each player has the same amount of information as the other (there is symmetry of information), but there are so many possibilities that even a brilliant player may not be able to make a fully rational decision. There is bounded rationality when there is imperfect ability to process the available information, and/or when the information itself is imperfect (that is, there is uncertainty) in relation to both present and future events. Opportunism relates to how people will respond to conflicts, given the existence of bounded rationality. They will behave opportunistically if they act in their self-interests by, for example, finding loopholes in contracts. If there was unbounded rationality, the potential opportunistic behaviour would be known, and avoided.

Asset specificity refers to assets, involving non-trivial investment, that are specific (or idiosyncratic) to particular transactions (for example, skills in an employer–employee contract). There are two types of assets in this context: physical and human. Physical asset specificity relates to site specificity – plant or equipment located close to supplier or customer; and to process specificity – plant or equipment that can be used only for a particular customer. These latter Williamson calls ‘dedicated assets’. Human asset specificity is where there are individual (‘learning by doing’) or collective (‘team configuration’) skills that are useful only (or mainly) for the particular transaction.

Bounded rationality is a cognitive condition, opportunism a behavioural condition and asset specificity a technological condition. Williamson shows that different combinations of these three conditions give rise to different contractual models (Williamson, 1985, p. 31).⁴ (This attention to contracts, in terms of the relations both within and between firms, has been a central feature of Williamson’s work on transaction cost analysis.)

To illustrate, if there was no opportunism, there would be no need for internalization. Without opportunism, Williamson (1985, p. 51) argues, ‘there is no occasion to supplant market exchange by other modes of economic organization if promises to behave in a joint profit-maximizing way are self-enforcing and if sharing rules are agreed to at the outset’.

Without opportunism, the transaction would take place within the market, rather than within a hierarchy. But bounded rationality is a precondition for opportunism. So, opportunism and bounded rationality are likely to give rise to internalization. This, however, is still only part of Williamson’s explanation for why and when internal governance will be preferable to market governance. The third element is asset specificity: ‘Market contracting gives way to bilateral contracting, which in turn is supplanted by unified contracting (internal governance) as asset specificity deepens’ (Williamson, 1985, p. 78). So, as Lazonick (2002) points out, asset specificity is the ‘critical condition that, according to Williamson, favours hierarchies over markets’. For asset specificity, assets involved in the transaction are, by definition, not freely available for other uses. There are costs involved in applying them in any other than this particular transaction. This results in a need for continuity, so that those who have invested in the assets can derive revenues from them. In terms of an individual adapting skills for a particular firm, for example, once that has been done, this is no longer the kind of ‘faceless contracting’ characteristic of market transactions – the ‘pairwise identity of the parties’ now matters (Williamson, 1985, p. 62). The more specific the asset, the greater the need for continuity, the more likely it will be that internal governance will replace market governance.

There are importance differences between Coase and Williamson. Williamson himself (1985, p. 78) differentiates his theory from that of Coase as follows:

	<i>Coase</i>	<i>Williamson</i>
Factors favouring organization of production in the firm rather than in the market	Bounded rationality	Bounded rationality, opportunism and asset specificity

While they understand the determinants of transaction costs differently, both Coase and Williamson are agreed that minimization of transaction cost is the basis for the existence of firms. Nevertheless, there is not unanimity on this issue. Alchian and Demsetz (1972) argued that *technological non-separability* is the main factor responsible for the existence of firms. This refers, for example, to essential co-operation among workers in order to load freight. The firm exists to monitor, measure and allocate the benefits of team performance. While this concept has been useful in emphasizing the network of relationships underlying – and created by – firms, it has not, in general, been as successful as transaction cost in the analysis of more complex organizations (Alchian, 1984; Williamson, 1985, p. 88). It should be added, however, that Demsetz (1988) has more recently argued that much of the work on transaction cost does not adequately take into account the role of the firm in the acquisition and use of knowledge. Loasby (1990) points out that ‘Demsetz recognizes the need for patterns of organization which foster the development and use of knowledge, and of the embodiment of knowledge in people, in a way which suggests an unrecognized link with the evolutionary theory of the firm’.

This particular inadequacy of Williamson’s transaction cost approach is elaborated by Lazonick (1991, ch. 6). Lazonick argues at length, and convincingly, that ‘Williamson has viewed the organization as an economic institution that can only *adapt* to a given economic environment’ (1991, p. 214). Williamson’s is a theory of the *adaptive* firm, and not the *innovative* firm. Lazonick draws on the work of Schumpeter and, in particular, Chandler, to develop an alternative theory, that of the innovative organization. He shows that, although dismissed by Williamson, strategic behaviour of firms is extremely important. Strategic behaviour includes, for example, the development of an organization’s resources, making them organization-specific assets, ‘with unique productive capabilities’ (Lazonick, 1991, p. 217). Lazonick (2002) shows that, in effect, Williamson takes the three sets of conditions – cognitive, behavioural and technological – as given and examines the optimal decision (market or hierarchy) under these constraints. What Williamson ignores, and what is crucial for a proper understanding of the modern, innovative firm, is an understanding of ‘innovative strategy’ – the ways in which the firm actually transforms the constraining conditions, particularly the technological conditions. So, whereas for Williamson asset specificity is an expression of market failure, for Lazonick it is an outcome of organizational success. And although Williamson accepts asset specificity as critical in the explanation of why firms exist and grow, he does not examine how firms change their physical and human assets.

In summary, Lazonick’s (1991, p. 224) view is that:

At best, Williamson’s transaction cost perspective explains what some established business organizations do to survive in a capitalist economy. With his focus exclusively on the adaptive organization, his . . . framework cannot explain how innovative organizations attain and sustain competitive advantage.

Related to the transaction cost theory's difficulty in explaining the innovative organization, is the problem of the innovation itself. We will discuss the theory of technological change and innovation in detail in Chapter 11. Among other recent concerns in that theory is the notion of incremental change, that is, change not arising from any revolutionary, patentable invention or innovation. Such changes can often not be patented, that is to say ownership rights cannot be established over them. By definition, therefore, they are not amenable to explanation by transaction cost analysis.

There are other criticisms of transaction cost theory. Hodgson (2004), for example, focuses on opportunism. He points out that, for Williamson, all transactions are affected by opportunism: 'self-interest seeking with guile'. This is, for Williamson, a crucial factor in the existence of hierarchies rather than markets. Hodgson (2004) shows that 'Williamson ignores several other reasons for the existence of hierarchical management structures. The undue emphasis criticised here is not on the existence of opportunism but on the identification of opportunism as the principal cause of management hierarchy'. Hodgson (2004) goes further, arguing that this overemphasis on opportunism in Williamson has implications for both analysis and practice of management. He shows that, in addition to opportunism, the problems of miscommunication and misinterpretation also influence governance structure. He concludes that 'management practice should be informed by actual and likely empirical realities, not by a false universal and *a priori* assumption that without opportunism, no governance structures would have any advantage over another'.

At an even more fundamental level, there is criticism even of Coase's basic conception of transaction cost minimization as the fundamental reason for the existence of the firm. Best (1990, p. 112) shows that Coase relies on diminishing returns to management to explain the size of the firm. The firm will grow, according to Coase, until the point is reached where 'the costs of organizing an extra transaction within the firm are equal to the costs involved in carrying out the transaction in the open market' (quoted in Best, 1990, p. 112). This dependence on substitution at the margin is a failing of neoclassical theory, too, Best argues, and it is a failing because it does not take into consideration that the firm may continue to grow until the industry is monopolized, before the point of diminishing returns to management is reached. If this were possible, it would lead to the indeterminacy of both price and firm size. Best applauds Coase for 'dropping the assumption of perfect information about the future', and for showing that market co-ordination is not synonymous with efficiency, that 'under certain conditions planned co-ordination within a firm could be more efficient'. But 'Coase, like Marshall, was constrained from developing promising concepts for analysing business organization by . . . the specter of inconsistency with the equilibrium theory of price' (Best, 1990, p. 112).

In similar vein and in the context of a discussion about the boundaries of firms, Penrose (1995, p. xvi) supports the notion that the dichotomy between firm and market is an inadequate foundation for the analysis of economic organization. Referring approvingly to Richardson (1972), she writes that 'the firm in reality is not an island in a sea of

market transactions, but itself part of a network consisting of rivals in direct competition, of suppliers of goods and services in special relationship as well as of consumers, be they individuals, organizations, other firms or even governments also in special relationship . . .’.

Another criticism of Coase is provided by Auerbach (1989, ch. 6), who argues that Coase, among others, is wrong to assume that markets exist, and that then, as a response to market imperfections, firms are created. This assumption results in a ‘failure to see the role of firms in the making of markets’. A market, according to Auerbach, is a behavioural relation. Without the participants (for example, firms), there would not be a market (Auerbach, 1989, pp. 121–2).

Penrose, Lazonick, Best, Auerbach and Hodgson, while criticizing other theories of the firm, have also developed their own theories, each of which is in some respects similar to the other, and all related closely to the evolutionary theory of the firm, to which we now turn.

4.6 Evolutionary and related theories of the firm

Evolutionary theorists, while acknowledging Williamson’s contribution and particularly his concern with firm-specific assets and skills, differ from him in relation to their basic unit of analysis. (See Chandler, 1992a, for a discussion of Williamson’s contribution to Chandler’s thinking.) For Williamson the basic unit of analysis is the transaction; for Chandler and other evolutionary theorists it is the firm itself ‘and its specific physical and human assets’ (Chandler, 1992b).⁵ The features of the firm on which they focus are strategy, structure and core *organizational capabilities*. Broadly defined, organizational capabilities refer to a firm’s spare managerial capacity arising from indivisibilities or different rates of growth of the various aspects of the firm, as well as the knowledge, skills and experience within the firm. The spare capacity can be in virtually any area of operation of the firm, including marketing, production, raw material procurement and finance (see Robertson and Langlois, 1995). Best (1990, p. 128) – drawing on Penrose (1959) – explains one aspect of the generation of spare capacity by arguing that ‘each time a new system is in place and procedures become routinized, idle managerial resources appear’. *Organizational routines* – different at different levels in the organization – are thus the building blocks of organizational capabilities. There are learned routines in each of the various functional areas of the organization – including buying, production, distribution, marketing and R&D – and, even more importantly, in the co-ordination of these functions (Chandler, 1992b).⁶ As Clark and Juma (1987, p. 59) put it: ‘Routine is the genetic code of the firm; it carries the adaptive information required for competition and survival.’⁷ Routines are the organizational memory of the firm (Nelson and Winter, 1982, p. 99).

Robertson and Langlois (1994) clarify the relationship between capabilities and routines by pointing out that ‘routines refer to what an organization actually does, while capabilities also include what it may do if its resources are reallocated. Thus a firm’s routines are a

subset of its capabilities that influence but do not fully determine what the firm is competent to achieve’.

It is important to note that the recently developed evolutionary theory of the firm is critical of that expounded by Alchian (1950), which was in essence a social Darwinist theory. According to this theory, the internal workings of the firm are irrelevant, because the ‘pressure to survive will in the long-term dictate the behaviour of firms’ (Auerbach, 1989, p. 46). Those that do not follow what turns out to have been the correct course of action (pursuit of profit) will not survive. Alchian’s theory ignores the patterns of behaviour, attitudes and motivations of firms or, to be more precise, he reduces all these to ‘adaptive, imitative, and trial-and-error behaviour in search for profits’ (Alchian, quoted in Clark and Juma, 1987, p. 52). The criticisms of Alchian’s evolutionary theory are that it was concerned with outcomes rather than processes, it was static, ignoring the time dimension (Auerbach, 1989, p. 48), and that it made technical change ‘exogenous to economic evolution’, a response to but not affecting market conditions (Clark and Juma, 1987, p. 53). Alchian’s was an extreme form of the structuralist view (Auerbach, 1989, p. 46).

Chandler (1992a, b) applies the evolutionary theory of the firm to the empirical information in his book *Scale and Scope* (1990). The theory, emphasizing ‘the continuous learning that makes a firm’s assets dynamic’, provides an understanding of how and why certain firms have succeeded (Chandler, 1992b, p. 98). In the late nineteenth century, for example, Britain had all the comparative advantages necessary for domination of the world dye markets, including the scientific knowledge, the raw materials and large markets, yet, by the turn of the century, German firms such as Bayer, BASF and Hoechst had become the world leaders. The explanation is the investment in production, distribution and management undertaken by the German firms. This investment was designed for – and succeeded in – the exploitation of economies of scale and scope. The German firms thereby achieved competitive advantage which offset the British comparative advantage.⁸ Moreover, like other successful firms in other industries, they continued to lead by expanding into foreign markets and related industries, ‘driven much less by the desire to reduce transaction, agency and other information costs and much more by a wish to utilize the competitive advantages created by the coordinated learned routines in production, distribution, marketing and improving existing products and processes’ (Chandler, 1992b, p. 93).

‘Economists,’ Chandler (1990, p. 593) writes, ‘particularly those of the more traditional mainstream school, have not developed a theory of the evolution of the firm as a dynamic organization’. His work contributes to, and encourages others in the development of, such a theory. Best (1990), for example, like Lazonick, draws on Schumpeter and, although critical of Chandler, formulates a theory of the firm which is consistent with the type of theoretical development that Chandler calls for. ‘Schumpeterian competition’ on which Best bases his theory, is very different from price competition. It focuses on competition from new commodities (which includes both new products and new versions of old

products), new sources of supply, new technologies and new types of organization. The firms most likely to face such competition successfully, Best argues, are not the hierarchically organized firms on which Chandler concentrates, but what he calls 'entrepreneurial' firms (Best, 1990, p. 11). There are three main characteristics of such firms. First, they act strategically, 'choosing the terrain on which to compete'. Second, they seek strategic advantage not through continuity and long production runs aimed at achieving cost minimization, but through continuous product, process and organizational innovation. Third, they organize production not by repeating the same operation but by maintaining organizational flexibility at all levels, including the micro-production level. 'They depend upon learning to maintain competitive advantage' (Best, 1990, p. 13).

Unlike Best, but also contributing to the evolutionary theory, Lazonick (1991, ch. 3) writes of the 'innovative' firm as one which adopts a high fixed cost strategy of developmental investments. The formation of a new cost structure is an 'evolutionary process' which, if successful, gives the firm competitive advantage. The process involves innovation because it 'creates quality-cost outcomes that previously did not exist' (1991, p. 97).

One implication of the difference between the perspectives of Best and Lazonick is that the former – with an emphasis on organizational flexibility – underlines the advantages of small firms, whereas the latter – emphasizing the advantages of a high fixed cost strategy – suggests that large firms are more likely to succeed. This difference shows that among writers broadly within the evolutionary tradition there is not necessarily unanimity, even on basic questions about firms. Robertson and Langlois (1994), in focusing on inertia, uncover another difference among evolutionary theorists of the firm. They show that Nelson and Winter (1982) are aware of both the positive and negative aspects of routine: 'To the extent that these routines are efficient and difficult to come by, they are a most important asset, but they also induce inertia because they are difficult for the firm to change once in place.' Teece (1982), on the other hand, though he discusses the positive aspects of routines, 'neglects the negative side . . . and fails to note that the inflexibility, or inertia, induced by routines and the capabilities that they generate can raise to prohibitive levels the cost of adopting a new technology or entering new fields' (Robertson and Langlois, 1994).

It could be argued that these differences among evolutionary theorists are increasing. In his recent work, Best (2001), for example, develops the idea of a *productivity triad* of business model, production system and skill formation to explain why some firms are successful. Examples of business models include the Japanese firm (*kaisha*) and industrial districts (see Chapter 8); examples of production systems include mass production of high-volume consumer products, and low-volume, complex product systems of production; and skill formation refers to the formal and informal training and education systems, both within and external to the firm, that contribute to the development of technological skills. The idea rests on what Best calls a 'capabilities and innovation perspective'. It involves a complex dynamic between the firm, its networked relations with other firms and its response to and strategic reconstituting of the market. That it departs from Nelson and Winter's conception

of an evolutionary theory of the firm is clear from the fact that Best (2001) makes no reference at all to 'routines'.

Even more clearly at odds with some of the fundamental tenets of evolutionary theory is the recent work of Lazonick (2002) and O'Sullivan (2000). O'Sullivan's critique of neoclassical theory of the firm, as we saw in Chapter 3, is based on the argument that neoclassical theory assumes that decisions are reversible, are taken by individuals, and are optimal. Innovation, on the other hand, is the result of processes that have three main characteristics. They are developmental or cumulative; organizational, involving co-ordinated action by a number of people, sometimes in different firms; and strategic, actually changing market conditions. While evolutionary theory of the firm comes close to answering her critique of neoclassical theory, she argues that it fails to provide for strategic decision making. It is developmental and organizational, but not strategic (O'Sullivan, 2000, pp. 30 and 36–8). She goes further, arguing that the very notion of routines as the basis for understanding organizational learning makes it difficult to integrate strategic decision making into evolutionary theory. Even the recent development from 'capabilities' to 'dynamic capabilities' (see below) does not solve the problem; evolutionary theory still 'ignores the influence that purposeful decisions have on' learning in the organization. As in neoclassical theory, she argues, there is 'automaticity' of decision making in evolutionary theory. In Lazonick's (2002) words, 'the dynamic capabilities approach has thus far ignored critical issues of strategic control within the innovative enterprise and the relation of strategic control to the organizational learning processes that are central to the development of an enterprise's core competences'. Lazonick (2002) refers to his and O'Sullivan's 'social conditions of innovative enterprise' (or SCIE) perspective, drawn from comparative-historical analysis of advanced economic development, as the theory of the innovative enterprise that can answer their criticisms of evolutionary and other theories. The SCIE perspective identifies 'three social conditions of innovative enterprise: financial commitment, organizational integration, and strategic control'. The first refers to commitment of finances to innovation, whether from the firm's own resources or those of other institutions. The second requires a commitment on the part of people throughout the organization to 'apply their skills and efforts to engage in interactive learning in pursuit of organizational goals'. The third condition enables decision makers 'to allocate resources in ways that can transform technologies and markets to generate innovations'.

There are two issues to take up at this point. The first is the question of whether there are responses from evolutionary theory to the above critiques. The second is the sense, if any, in which Best, Lazonick, O'Sullivan and others should be included in a discussion of evolutionary theories of the firm.

In relation to the first, let us focus on whether the accusation of 'automaticity' of decision making in evolutionary theory is appropriate.⁹ Does purposeful decision making have a place in evolutionary economics? Even before the idea of 'dynamic capabilities' was introduced, evolutionary economics had explicitly not excluded strategic decisions.

Undoubtedly, there is a great deal of business behavior that is not, within the ordinary meaning of the term, 'routine.' Equally clearly, much of the business decision making that is of the highest importance, both from the point of view of the individual firm and from that of society, is non-routine. High-level business executives do not, in the modern world, spend humdrum days at the office applying the same solutions to the same problems that they were dealing with five years before. We do not intend to imply any denial of these propositions in building our theory of business behavior on the notion of routine (Nelson and Winter, 1982, p. 15).

It could be argued, nevertheless, that this non-routine decision making is peripheral to evolutionary theory. Recent work on dynamic capabilities has explicitly aimed at integrating such decision making into evolutionary theory. Zollo and Winter (2001) distinguish dynamic capabilities, which they define as 'systematic change efforts', from organizational routines which are 'geared towards the operational functioning of the firm' and consider that dynamic capabilities derive from learning mechanisms that 'go beyond semi-automatic stimulus-response processes and tacit accumulation of experience'. Dynamic capabilities include an element of experiential learning, but are also the outcome of more deliberative cognitive processes aimed at developing explicit knowledge: 'dynamic capabilities emerge from the co-evolution of tacit experience accumulation processes with explicit knowledge articulation and codification activities'. This type of learning can result 'in adaptive adjustments to the existing sets of routines or in enhanced recognition of the need for more fundamental change'. Zollo and Winter's developed conception of dynamic capabilities captures the strategic actions of deliberate reflection on firm learning and capability.

It is clear, at least, that the criticism of 'automaticity' – that strategic decision making is excluded from evolutionary theory – is being addressed by evolutionary theorists. It is also clear, however, that there are important differences between some of the writers discussed in this section. Are there also common elements in the work of these theorists?

Among the unifying themes, they are all interested in change over the long term – years and decades rather than weeks and months. They are all convinced of the importance of change within firms, not just in terms of products, but also in terms of processes of production and of decision making. They all focus to some extent on industries as well as firms, their concern for what goes on within firms being related to their interest in the determinants of success of one firm or group of firms over another. Finally, they all adapt and use elements of other theories – in particular, managerial and transaction cost – in the development of their own views on the nature of firms and industries.

Hodgson (2002),¹⁰ calling them 'evolutionary, resource-based or competence-based perspectives', finds a more fundamental commonality. In these perspectives, he writes, 'the existence, structure and boundaries of the firm are explained by the associated existence of individual or team competences – such as skills and tacit knowledge – which are in some way fostered and maintained by that organization'. This is in contrast to the 'contractarian' theories, in particular Williamson's transaction cost theory, principal-agent theory and other 'nexus of contract' theories. What the contractarian theories have in common is that

in all of them ‘the informational and other difficulties in formulating, monitoring and policing contracts are the crucial explanatory elements’ (Hodgson, 2002).

The ideas of the evolutionary and related theorists will be among those that inform our discussions of the conduct and behaviour of firms. It should be pointed out that, as a far more empirically based and inductive approach than many of the others discussed above, evolutionary theory is also more difficult to rigorously operationalize. As a result of this, research losses may be incurred, but there are also gains to be derived from the extent to which this approach is empirically and historically rooted. Schmalensee (1987) has written of the continued necessity for empirical studies as ‘an important source of the general stylized facts needed to guide the construction of useful theoretical tools’. Chandler’s work, and that of other evolutionary theorists, can be seen in this light.

4.7 Applications

We briefly address in this section applications of some of the theories described in this and the previous chapter. We begin with neoclassical theory. With its assumptions of rational, optimizing behaviour, market-based solutions and equilibrium outcomes, neoclassical theory of the firm is analytically useful in situations where there are strong markets and high levels of competition. The ‘neoclassical’ firm, smoothly shifting between capital and labour inputs, for example, will use automated equipment rather than skilled labour if wages rise. The rapid rise of wages of computer software experts in the late 1990s can be seen, from a neoclassical perspective, as a key factor in the increasing tendency for firms to outsource software development during that period. They increased their internal capital–labour ratios in response to the rise in the price of labour.

From a principal–agent perspective, the same issue of whether to directly employ software engineers or to outsource the service, would be addressed differently. The question would be one of the nature of monitoring, moral hazard and shirking. Let us assume that there is a software task to be undertaken that is clearly specifiable. Managers in the firm have no expertise in software development and therefore have no way of monitoring employees. This, they believe, increases the likelihood of the moral hazard of shirking. Given the shortage of software engineers, managers also have a problem selecting appropriate candidates for internal employment. They therefore turn to the market and hire the best software house – in terms of reputation, price and time – to undertake the task.

Transaction cost theory directly addresses, in the same circumstances, the make or buy decision. If the costs of outsourcing (that is, those costs other than the costs of the software service itself) are too high, then the firm will employ software engineers directly. It is generally assumed in transaction cost theory that, given the existence of bounded rationality and opportunism in inter-firm contracts – the risks/costs of outsourcing – the firm will internalize. The exception would be where there is a high level of asset specificity. In the above case this would be a software project that really is one-off, for example a

software product that requires no ongoing maintenance. The less likely this is, the more likely is the firm to employ software engineers directly, even at a high wage cost. (High wages would have to be paid in the contracted firm, too, raising the price of the outsourced service.)

In behavioural and stakeholder theories, it could be argued that it makes little difference as to whether software is produced by additional direct employees or by an outside firm. Both become members of the coalition – or stakeholders. However, behavioural theory, for example, can help answer the question by focusing on how each of the two options threatens or enhances the interests of existing constituents. Employing additional, highly paid workers could be opposed by existing workers if they feel that this reduces the likelihood of increases in their own wages. On the other hand, outsourcing could be seen as transferring profit to an outside company that could be earned by the firm itself. It is in the bargaining process among the constituencies, possibly with the taking up of some of the organizational slack to offer compromises, that the ‘correct’ decision is taken. It will be correct in the sense that it is satisficing – that it provides sufficient profit to keep the firm in existence without threatening the coalition.

Evolutionary theory is best applied to changes in firms that take place over relatively long periods of time. However, there are examples of the application of the theory to more immediate changes in the firm’s environment (Hilliard and Jacobson, 2003). Here we focus on the firm’s capabilities and routines. If there are existing routines for responding to a situation, then, all else being equal, these routines could again be used. However, if the firm has dynamic capability then it can depart from past routines (overcome path dependency). The suggestion in our discussion of the application of principal–agent theory, that managers have no skills in software development, would not apply here. Firms with dynamic capability are firms that have the ability to ‘identify and implement new learning, new kinds of knowledge and new organisational processes’.¹¹ While this may not help us to determine whether the firm will internalize or outsource the software project, it does help us to identify those firms that will face the question with a strategic rather than simply a reactive focus. In a changing environment, the most important factor for successful adaptation is the ability to identify and implement new learning, new kinds of knowledge and new organizational processes, but this will only happen where the firm’s perceptions of future opportunity support such a strategy.

4.8 Summary

This and the previous chapters have briefly reviewed the major theories of the firm. Each theory has merits, and each has limitations. They are not necessarily mutually exclusive, in that some economists will use one theory for one application, and another for a different application. It is also true, however, that in relation to some questions – for example, in relation to the nature and survival of the firm – different theories will provide different answers. Among the key differences between theories is the extent to which mathematics is used in their application. Although we aim to minimize the use of mathematics in this book, most of the theories in Chapter 3 are amenable to mathematical application, whereas most of those in this chapter are not.¹² Table 4.1 is a continuation of Table 3.2, showing the points of focus of the theories of the firm covered in this chapter.

Table 4.1 Major theories of the firm

Theory of the firm	Point of focus
Behavioural theory	Firm as coalition (satisficing decision)
Stakeholder theory	Returns to stakeholders (fair or market-based)
Co-operative game	Firm (organizational equilibrium)
Transaction cost	Transaction (firm v. market)
Evolutionary	Firm (organizational capability)

As mentioned earlier, rigorous empirical research is rare. Chandler (1992a), as a business historian working within (and developing) the framework of evolutionary theory, is unusual among theorists of the firm in having an empirical basis for his views. Indeed, in his book on *Scale and Scope* (1990), he compares ‘the fortunes of more than 600 enterprises – the 200 largest industrial firms at three points in time (First World War, 1929, and Second World War) in each of the three major industrial economies’ (Chandler, 1992b). On a much more limited basis, Hilliard and Jacobson (2003) show the importance of dynamic capability among a group of 16 pharmaceutical firms in Ireland.

The significance of technological change (including organizational innovation) as a factor in the conduct (and structure) of firms and in the structure of markets, is accepted in much of the literature. The technological non-separability and transaction cost views both to some extent incorporate this, but it is more fully accounted for by the evolutionary and related theories.

Within the historical, empirical and inductive approaches adopted by the evolutionary and related theorists, the roles of technology and innovation are included. Chandler, for

example, compares the role in the growth of firms of specific technologies and market situations with that of existing competitive advantages arising from learned routines in 'production, distribution and marketing, and improving existing products and processes'. Specific technologies and market situations were, he concludes, more important in the vertical integration of firms. The desire to exploit competitive advantages arising from the learned routines was more important in the growth into new markets (Chandler, 1992b). This includes expansion into markets in regions new to the operations of the firm, which brings in the geographical dimension of industrial structure to which we turn in Chapter 8.

Best, Lazonick and O'Sullivan also explicitly incorporate technology and innovation, and this perspective leads them also to address locational issues. In Lazonick's words, firms' strategies and structures 'take on a national character because the relevant business organizations do not develop and utilize resources in a political and cultural vacuum' (Lazonick, 1991, p. 109). Best accepts even sub-national regional differences, as evidenced in his focus on small-firm industrial districts in Italy. These, too, are addressed in the context of the locational aspects of industrial structure in Chapter 8. Regional and national systems of innovation are also considered in Chapter 8, but first we turn to industrial structure in general.

Websites

As for most of the other chapters in this book, the IDEAS website at <http://ideas.repec.org/> provides many online resources on the topics covered, and authors mentioned, in Chapter 2.

There is a vast amount of information, articles and references available on the web on Coase and transaction cost economics. Just one example, which also contains many links to other sites, is http://faculty.washington.edu/krumme/readings/transaction_cost.html

A number of individual economists' websites are of particular interest for this chapter. A great deal of information on, and papers by, Herbert A. Simon are available at <http://cepa.newschool.edu/het/profiles/simon.htm>. Geoffrey Hodgson's site is <http://www.herts.ac.uk/business/esst/Staff/g-hodgson/hodgson.html>, where many of his papers can be viewed. Nicolai Foss, although he is not referred to in this chapter, has produced many books and articles that are of direct relevance to many of the questions raised here. His site, <http://web.cbs.dk/staff/nicolai-foss/njf.html>, provides online access to some of his work. Richard Langlois, whose work is in some respects similar to that of Foss, has a site at <http://web.uconn.edu/langlois/>

Interesting material on and by early economists who were influential in the development of evolutionary theory, including Thorstein Veblen and Joseph Schumpeter, is available at <http://cepa.newschool.edu/het/>. A great deal of other material on evolutionary economics,

including many downloadable papers and links to other sites, is available at <http://www.business.aau.dk/evolution/>, which is a site maintained by Esben Sloth Andersen, at Copenhagen Business School.

Questions

- 4.1 What is the behavioural theory's critique of neoclassical theory?
- 4.2 Do you agree that stakeholder theory is not really a theory, but rather a prescription for an ethical business world?
- 4.3 According to Coase, what is the essence of the firm?
- 4.4 Why is the evolutionary theory of the firm so called?
- 4.5 Apply the theories of the firm to the question of how firms will respond to more rigorous environmental protection regulation.

Notes

- 1 For a brief account of Simon and his contributions, see Butler (2002).
- 2 See also Aoki (1988) and Aoki *et al.* (1990).
- 3 Economies of scale arise when the production cost per unit of a good decreases as the number of units produced increases. Economies of scope exist when the cost of producing good x and good y together is less than that of producing either of them separately. For a detailed study of the significance of scale and scope in the evolution of firms, see Chandler (1990).
- 4 Different contractual models in this context refers primarily to internal governance and market governance or, in other words, hierarchy and market.
- 5 The most important evolutionary economists are Nelson and Winter (1982). See also Nelson (1995) and Teece (1987). Among the more important and prolific of recent evolutionary economists is Hodgson (1998a, b, 2002). It should be noted that at least some writers using 'an evolutionary approach to economic change' focus as much on the process of innovation as on firms. Thus Clark and Juma (1987, p. 64) attempt 'to examine the co-evolution between technology and institutions'. Auerbach (1989), although he is clearly concerned with the evolution of 'giant firms' (p. 149) and the changing pattern of firm organization (ch. 8), focuses primarily on the competitive process (chs 4 and 9).
- 6 This article also shows how evolutionary theory, drawing on transaction cost analysis but emphasizing the 'continuous learning that makes a firm's assets dynamic', clarifies the basis for the emergence and development of firms in some of the major industries of the world (Chandler, 1992b).
- 7 Demsetz (1988) is interested in the preservation of commitments, which may be either efficiency enhancing or stultifying. As Loasby (1990) points out, this reinforces Demsetz's unrecognized link with the evolutionary theorists. For a brief discussion of the biological analogy in evolutionary theory of the firm, see Hodgson (2002).
- 8 The comparison between comparative and competitive advantages is also made by a number of other authors, including Teece (1987) and Porter (1990).
- 9 This and the following two paragraphs draw directly on Hilliard and Jacobson (2003).
- 10 Drawing on Foss (1993)

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- 11 Hilliard and Jacobson (2003) conclude that, 'in a changing environment, the most important factor for successful adaptation is the ability to identify and implement new learning, new kinds of knowledge and new organisational processes, but that this will only happen where the firm's perceptions of future opportunity support such a strategy.'
- 12 It should be noted, however, that with simplifying assumptions, mathematics can be used in any theory.