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## Absorptive Capacity

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### Abstract

Absorptive capacity is an organizational ability to evaluate, assimilate and commercialize knowledge that originates outside the firm. Cohen and Levinthal popularized the concept with their model describing R&D as having dual roles as a source of innovation and as a means of enhancing the firm's ability to learn. In the large literature that developed, many studies follow this logic to link absorptive capacity to factors that shape the flow of knowledge across organizations such as firms' social networks or search patterns. Other studies emphasize the firm's routine behaviours and the link to performance outcomes in the context of firm-level activities including technology sourcing, alliances, innovation and strategic renewal.

**Definition** Absorptive capacity is the ability of a firm to recognize, assimilate and commercialize the value of external knowledge (Cohen and Levinthal 1989, 1990). Cohen and Levinthal viewed this ability as a function of firm-specific investments, most notably the firm's prior relevant R&D. Over

time, scholars have elaborated on the capabilities involved and linked absorptive capacity to a broader range of factors including the firm's social networks, complementary organizational search routines and incentive structures within the firm.

Absorptive capacity in the context of research on knowledge flows across organizations was popularized by Cohen and Levinthal (1989, 1990). Previous authors acknowledge the importance of knowledge absorption (for antecedents see Lane et al. 2006: 836). The term itself has prior use in development economics by scholars discussing foreign capital inflow and the limitations to returns on foreign investment in developing economies given existing levels of complementary factors, for example workforces with appropriate skills (see Rosenstein-Rodan 1943; Adler 1965). But it was Cohen and Levinthal who elaborated the underlying logic of absorptive capacity at the organizational level and conducted the first comprehensive empirical tests for its effects. Based on both economic logic (1989) and cognitive factors (1990) they argue that a firm's prior related knowledge is a major determinant of its ability to learn. It is important to recognize that although absorptive capacity may sound as if it is motivated by individual-level considerations, it is posited to be an organizational-level construct (1990: 131); one that is shaped by the firm's communications structures and organizational routines. Another important insight is that absorptive capacity is cumulative and path-dependent; as such it is

sometimes considered to be a source of competitive advantage.

Cohen and Levinthal's seminal work has spawned a large literature, with over 23,000 citations on Google Scholar as of October 2014. Part of its appeal is that it presents an alternative to the conception by Nelson (1959) and Arrow (1962) that knowledge, once produced, is a public good that flows freely across organizations. Absorptive capacity evokes a view that knowledge flows are somewhat more circumscribed, requiring a firm to exert its own effort to acquire external knowledge, this effort contingent upon technological, social and economic factors (see 'The determinants of R&D' below). This view is consistent with that of Penrose (1959) who emphasized the importance of making changes in the external environment to firms' internal knowledge and resources.

While absorptive capacity offers a valuable conceptual building block to scholars of innovation, several criticisms have been raised in the literature. First, the concept is broadly construed and used in inconsistent ways by various authors (Zahra and George 2002). Second, studies rarely employ longitudinal research methods or process models, and understate the importance of feedback loops in the learning process (Todorova and Durisin 2007). Third, the concept of absorptive capacity itself has gone through little theoretical development. Conceptual contributions include Lane and Lubatkin's (1998) idea of relative absorptive capacity, Zahra and George's (2002) distinction between potential and realized capacity, and Lim's (2010) three types of absorptive capacity, which exist depending upon the type of knowledge absorbed and stage of industry evolution. Yet, given the size of the accompanying empirical literature, there has been surprisingly little conceptual development.

On the empirical front, a large literature has emerged that makes use of the absorptive capacity construct in empirical tests. Many firm-specific and industry-specific studies suggest the importance of absorptive capacity, linking it to firm performance, firm-level activity and interfirm networks. With such heterogeneity a unified view remains an elusive target for empirical scholars. Lane et al. (2006: 841) critique absorptive

capacity as having become 'taken-for-granted', or 'reified', with 80% of cited papers making superficial use of the concept with no discussion of its foundations.

Despite these concerns, absorptive capacity remains an important and widely used concept, appearing in the full text of over 4,000 academic papers during the first 8 months of 2013. The concept features in 110 of those papers' titles, as it does in 168 titles published during the previous year.

## The Determinants of R&D

Cohen and Levinthal's original papers (1989, 1990) were major contributions to areas of strategy and economics concerned with how firms exploit external R&D. Many subsequent studies have depicted the dual roles of R&D, as a source of innovation and means of enhancing the firm's ability to learn. Although absorptive capacity is hard to observe empirically, scholars have devised ways to test for its effects and extend its implications using proxy measures – commonly, R&D expenditures and R&D intensity (the ratio of R&D expenditures to firm size).

A central stream of research follows Cohen and Levinthal in upholding the centrality of factors classically ascribed as the key determinants of R&D – technological opportunity, appropriability conditions, intra-organizational spillovers and patterns of demand. The effects of these industry characteristics on R&D are shown to be moderated by the firm's own knowledge stocks and competences (Cohen and Levinthal 1989; Arbussa and Coenders 2007; Rothaermel and Alexandre 2009).

Absorptive capacity studies have contributed to new insights into the dynamics and determinants of innovation. While many studies are at the level of the firm, contributions also focus on indigenous research effort and infrastructure (Kim and Dahlman 1992), 'learning-by-exporting' or importing (Liu and Buck 2007), and the evolution of national innovation systems (Mowery and Oxley 1995; Castellacci and Natera 2013). In fact, one of the earliest microeconomic

studies of absorptive capacity was on cultural constraints in international technology transfer (Kedia and Bhagat 1988). Broadly, these contributions support a movement among scholars influenced by evolutionary economics, away from a linear view of innovation towards a more integrated model (Kline and Rosenberg 1986). Where the postwar economic paradigm counselled firms to be strongly self-reliant, the now prevailing counter-view depicts technological progress as the outcome of complex interactions between knowledge producers, users and brokers.

Economic governance and competition is increasingly characterized by how organizations respond to competence-destroying technical change and flows of intangible capital. Since the early 1990s, invention and information have become more broadly distributed, such that no single organization has the internal capabilities necessary to exploit novel developments (Veugelers 1997). Absorptive capacity has been an important element linked to a range of emergent organizational practices. In international business, firms have moved from traditional resource-sharing alliances towards learning-centred partnerships (Lane and Lubatkin 1998) and collaborative R&D. Open learning enables firms to formulate new technical standards (Mowery et al. 1996) and to spread the risks in innovation, such as when entering new markets (Fu et al. 2013). Absorptive capacity serves as a crucial factor explaining how firms behave in alliance relationships (Mowery et al. 1996) and technology markets (Arora and Gambardella 1994).

### **Absorptive Capacity and the Flow of Knowledge**

Firms' absorptive capacities shape R&D investment within an industry (Cohen and Levinthal 1989) because they exert a positive marginal effect on the firm's incentive to learn. This effect, however, depends on underlying scientific or technological characteristics of the domain in which a firm looks to innovate. Firms in 'difficult

learning environments' must draw on external science that is less targeted to commercial ends, more complex and better protected. Under these conditions, in-house ▶ **basic research** becomes relatively more important in permitting the firm to recognize, assimilate and exploit valuable knowledge (Rosenberg 1990; Dyer and Singh 1998).

From the mid-1990s, these insights motivated research into the diffusion of scientific knowledge. The pharmaceutical and biotechnology industries, as settings for research, have facilitated an examination of how science links with technology (Foray 2004: 55) and how incumbent firms respond to radical technological change. Investing in basic science is the price firms pay to 'plug into the outside information network' (Rosenberg 1990) and exploit outside scientific findings (Pavitt 1991). Research on biotechnology emphasized the effect of a firm's external connections on inventive performance outcomes (Powell et al. 1996). Cockburn and Henderson (1998) explored how firms develop scientific capabilities. They showed that large US pharmaceutical firms relied on a complex set of activities for knowledge absorption, including 'pro-publication' policies and promotions based on scientific reputations. When understood in terms of firms' 'connectedness' with basic science, absorptive capacity helps explain variability among firms and how they co-evolve with their environment. Specifically, the concept can help explain the differential rates at which firms adopt a superior capability (Cockburn et al. 2000).

Cohen and Levinthal conceived absorptive capacity as path-dependent and contingent upon the partner. Firms in knowledge-intensive industries (e.g., biopharmaceuticals) depend upon scientific capabilities to guide the development of new products and processes (Gambardella 1992). Search efficiency is increased by collaboration with university scientists: it increases the speed at which firms exploit existing knowledge to generate inventions, and this effect is more pronounced for firms that develop absorptive capacity via internal basic research (Fabrizio 2009). While recognizing that the value of scientific capabilities varies at different stages of

industry maturity, the flow of scientific knowledge opens up opportunities for novelty and facilitates change in organizational processes and technological orientation (Pisano 1994).

Lane et al. (2006) suggested that the problem of reification can be addressed only by investigating absorptive capacity's 'building blocks' and diverse applications. This impulse links two disparate strands of the literature – studies on knowledge flows (this section) with research that describes absorptive capacity in organizational processes (next section). The middle path may be a view that absorptive capacity is relative, founded in relationships that enable learning, but also in organizational processes that drive convergent and divergent development between firms within fields of innovation. Thus, Lane and Lubatkin's (1998) idea of relative absorptive capacity highlights the structural and operational similarities between organizations that facilitate knowledge transfer. That study evokes empirical findings by Mowery et al. (1998) that the ability of firms to share capabilities through strategic alliance depends on extant overlaps in their technological portfolios.

Another nuanced view emerges in studies that differentiate forms of absorptive capacity; some based within high-level cognitive relationships and practices, others functionally determined by dynamics of the technology market. Firms use a diverse range of activities to build strategic orientation and flexibility into the organizational resource base. In low technology sectors (e.g., services), the ability of firms to scan the market for valuable technologies relies on knowledge of business trends and technologies at a user level, as demonstrated empirically by Arbussa and Coenders (2007). These authors build on Cassiman and Veugelers' (2002) argument that absorptive capacity has two dimensions: recognizing the value of new technologies constitutes a separate capacity from integrating complex knowledge. Lim (2010), by contrast, clarifies the 'many faces' of absorptive capacity. In a high technology setting (semiconductors), different absorptive capacities may develop to reflect the strategic choices of individual firms. Technological maturation and market position can lead a firm to invest in the absorption of knowledge encoded

in tools, artefacts and processes, leaving others to invest in disciplinary or domain-centred expertise.

## Organizational Antecedents and Other Uses of Absorptive Capacity

The modern theory of the firm has engendered intensive research on the firm's decision to 'make' or 'buy' intermediate inputs (Simon 1951; Coase 1991). These choices are sometimes complementary (Veugelers 1997; Veugelers and Cassiman 1999). Firms may tap external knowledge sources through M&A activities, licensing or by hiring researchers with relevant knowledge (Arora and Gambardella 1990). In research that goes right to questions about the nature and boundaries of the firm, absorptive capacity has been used by scholars to link internal and external sourcing.

Absorptive capacity is framed in many studies as a ► **dynamic capability**. In this literature, the firm's decision to collaborate is viewed as a variant of the make-or-buy decision. This reflects a broader position about the origins of competitive advantage: organizational processes should support the continued endowment of firms with superior routines and new knowledge as environments change (Teece et al. 1997). That is, absorptive capacity can have a direct impact on performance and adaptation. At its deepest level, it is part of a system of organizational practices by which firms 'build, integrate and reconfigure organizational resources and competences' (Adner and Helfat 2003). Companies enact unique configurations of routines oriented to the exploitation and exploration of internal and external knowledge. For example, firms may readily imitate 3 M's well-described policy that 15% of employees' time remains unaccounted for in the hope of fostering experimentation, but fail to replicate crucial unobserved social mechanisms by which that policy succeeds (Lewin et al. 2011). The absorptive capacity concept has gained additional traction with the development of a knowledge-based view of the firm (Grant and Baden-Fuller 1995; Conner and Prahalad 1996).

The work on capabilities presents a different view on absorptive capacity than in earlier work.

Thus, over the past decade, a series of articles have called for a theory that focuses on the organizational antecedents of absorptive capacity (Jansen et al. 2005; Lane et al. 2006; Volberda et al. 2010). One attempt is Zahra and George's (2002) model which differentiates two forms of absorptive capacity – that which is 'realized' in the form of new products, processes or services, and that which remains latent in the firm's resource base. Knowledge acquisition and assimilation routines may be deployed in the interests of strategic flexibility. As Todorova and Durisin note, Cohen and Levinthal's original model held that absorptive capacity moderates the effect of appropriability over R&D investment. By contrast, Zahra and George depict a more direct relationship between absorptive capacity and its consequences (Todorova and Durisin 2007).

Beyond R&D, absorptive capacity is also now being used in many other streams of innovation research. This includes studies on entrepreneurship (George and Prabhu 2003), open learning systems (Jensen and Webster 2009; Robertson et al. 2010), and influence networks such as China's Guanxi system (Fu et al. 2013). The managerial cognition literature is a promising area of development, highlighting the processes by which managers translate their interpretations of change into strategic choice, including into R&D strategies (Kor 2006). Eggers and Kaplan (2009) build on this, and investigate the degree to which cognitive effects interact with organizational orientation in processes of strategic renewal. In combination with managerial cognition, absorptive capacity is shown to be important in allowing the firm to overcome structural and cognitive barriers.

## See Also

- ▶ [Appropriability](#)
- ▶ [Basic Research](#)
- ▶ [Dynamic Capabilities](#)
- ▶ [Inter-organizational Learning](#)
- ▶ [Knowledge Networks](#)
- ▶ [Knowledge Sourcing](#)
- ▶ [Knowledge Spillovers](#)
- ▶ [Markets for Technology](#)

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## Academic Entrepreneurship

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### Abstract

We define academic entrepreneurship here as the creation of new businesses based on university-developed knowledge. We review the legislative and organizational interventions enacted to foster academic entrepreneurship; the form, magnitude and performance of this activity; and the trade-offs between academic entrepreneurship and scholarly research.

**Definition** Academic entrepreneurship involves the creation of new businesses to commercialize knowledge developed in universities. It includes spin-off companies based on university-assigned intellectual property as well as that not assigned to the institution.

### Historical Overview

Since the 1980s, stakeholders have increasingly viewed the commercialization of knowledge generated by faculty, staff and students as an important role of universities (Etzkowitz 1983; Shane 2004). Triggered by the economic slowdown of the 1970s, policymakers have established incentives to encourage universities to commercialize knowledge to spur economic growth. Simultaneously, universities have embraced commercialization as a way to finance research in the wake of the reduction of public funding (Bruneel et al. 2010).

Many countries have adopted policies to encourage the commercialization of academic research. In the United States, the Bayh–Dole Patent and Trademark Amendments Act of 1980 allowed universities conducting federally funded research to hold title to and patent their research

results. In the 1980s and 1990s, similar reforms were enacted in other countries, including France, Germany, Italy, China, Japan, the United Kingdom, Sweden and the Netherlands (Mustar and Laredo 2002; Kneller 2003; Wright et al. 2007; Xiwei and Xiangdong 2007; Lissoni et al. 2008; Fini et al. 2011; Geuna and Rossi 2011).

Academic entrepreneurship has increased substantially in most countries where these changes have taken place. Evidence from the US shows that the increase was particularly strong in institutions less involved in commercialization before the policy changes took place (Mowery et al. 2001). While trends in company formation that do not involve university-assigned **intellectual property** are difficult to track, in the United States spin-offs involving university-assigned patents have grown since the passage of the Bayh–Dole Act. According to the data collected by the Association of University Technology Managers (AUTM 2009) between 1980 and 2009, 5726 spin-offs were founded by US institutions, of which 4567 were still operating by the end of 2009. While the rate of creation of spin-off companies varies both across time and institutions, the share of universities from which spin-offs have been founded has increased over time, as has the number of start-ups per year per institution.

However, not all new businesses founded to commercialize university knowledge are based on university-assigned intellectual property. Drawing on a survey of about 11,000 US professors, Fini et al. (2010) found that two-thirds of the businesses founded by academics were not based on inventions disclosed to or patented by the university.

Some university spin-offs have been extremely successful. Among the winners are Genentech, Google and Cirrus Logic in the US, Turbo Power Systems in the UK and Silicon Biosystems in Italy.

### Organizational Changes and Challenges

Several studies have identified differences across universities in the formation of new companies. Di Gregorio and Shane (2003) find that some universities generate more spin-offs than others

because of their intellectual eminence, their policies of making equity investments in spin-offs and their tendency to give inventors a lesser share of royalties. O'Shea and colleagues (2005) show that previous success in technology transfer activities, high faculty quality, and a strong science and engineering funding base enhance spin-off activity.

Other studies have looked at organizational changes that encourage the formation of spin-off companies. These include the formation of technology transfer offices (Markman et al. 2005) and incubators to provide physical space and support to new firms (Rothaermel and Thursby 2005). In contrast, venture capital funds created to finance university spin-offs have had less impact on spin-off company creation (Lerner 2005).

### Academic Versus Non-academic Entrepreneurship

Academic entrepreneurship differs from non-academic because the cognitive profiles, skills and preferences of academic entrepreneurs differ from those of others (Fini and Lacetera 2010), and this affects strategic choices and outcomes (Colombo and Piva 2012). Academics tend to start companies to exploit very early stage inventions that demand further inventor involvement (Jensen et al. 2003). Moreover, academic entrepreneurs tend to focus on commercially relevant research only if very positive outcomes are expected because they also derive utility from non-commercial activities (Lacetera 2009). Academic spin-offs are also more innovative than other technology start-ups without necessarily achieving better market performances (George et al. 2002), and have less extreme outcomes, displaying lower failure rates and rates of high growth (Rothaermel and Thursby 2005; Zhang 2009).

### Trade-Offs and Misalignments Among Different Functions and Incentives

Although several studies show that ► [licensing](#) has no negative effect on academic research

productivity (Agrawal and Henderson 2002; Thursby et al. 2007; Goldfarb et al. 2009), and others show complementarity between patenting and publishing (Azoulay et al. 2007, 2009; Breschi et al. 2008), there is very limited evidence on the relationship between spin-off company formation on academic research productivity (Buenstorf 2009; Toole and Czarnitzki 2010). However, some research suggests that the effect might be negative because patenting is associated with delays in the dissemination of research findings and a focusing of researchers' efforts away from the advancement of public knowledge (Campbell et al. 2002; Krinsky 2003).

### See Also

- [Intellectual Capital](#)
- [Licensing](#)
- [Research and Development \(R&D\) Organization](#)
- [Science and Innovation](#)
- [Science Policy](#)

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## Acquisition Strategy

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### Abstract

Acquisitions are an integral part of corporate strategy. Acquisitions can potentially create value through several mechanisms; for example, increasing market power, economies of scale and scope, increasing the knowledge base, and complementary asset accessibility. However, empirical studies often report the

loss of value in acquisitions, especially for acquirers. Value loss in acquisitions can be related to several reasons; specifically, agency problems, hubris target selection and/or overpayment in bidding competitions. In this article, value-creation and value-loss mechanisms in acquisitions are discussed based on five theoretical perspectives.

**Definition** An acquisition occurs when a bidder firm purchases a target firm. If a target firm agrees to an acquisition transaction, a friendly acquisition occurs. An unfriendly acquisition occurs when a target firm disagrees with an acquisition deal, but a bidder firm acquires the target firm through tender offers. In contrast, a merger occurs when two similar-sized firms combine their assets.

Firms have been widely increasing the use of mergers and acquisitions (M&A) for various reasons. For instance, some firms try to consolidate existing market share through M&A (e.g., steel and other resource commodity manufacturers), whereas other firms use M&A to extend their knowledge bases (e.g., pharmaceutical and biotech companies). In general, firms use M&A strategies to build market power, achieve economies of scale and scope, reduce market hazards and uncertainties, strengthen learning capabilities, acquire complementary assets and leverage internal financial capital (Singh and Montgomery 1987; Bradley et al. 1988; Anand and Singh 1997; Capron et al. 1998; Anand 2005).

However, achieving value creation through M&A is not always feasible. Indeed, a considerable number of M&A result in financial losses, and academic research has identified several reasons regarding loss of value in M&A: for example, poor decision-making (Jemison and Sitkin 1986), overhead costs required for post-M&A integration (Agarwal et al. 2012), agency problems (Amihud and Lev 1981; Anand 2004) and hubris target selection (Haleblian and Finkelstein 1999).

Given the risk of possible value loss in M&A, firms need to carefully formulate their M&A strategies. Based on five theoretical perspectives, we derive value-creation mechanisms in M&A. The five theoretical perspectives include ► **industrial**

**organization**, ► **resource-based view**, ► **evolutionary theory**, ► **transaction cost economics** and ► **agency theory**.

## Industrial Organization

The industrial organization economics (IO) perspective shows how market structures are related to value creation in M&A. Scholars in IO argue that firms create value if they can build market power through M&A. For example, horizontal M&A can reduce the intensity of rivalry in an industry, enhancing the overall profitability of the acquirers (Porter 1980). In addition, firms can increase production scales by acquiring their competitors. This horizontal M&A enables firms to lower production costs and achieve economies of scale (Moatti et al. 2011). Horizontal M&A can be also used to lessen multi-market competitions with rivals. In essence, firms tend to compete less vigorously in one market due to a possible risk of retaliation in other markets (Kamrani and Wernerfelt 1985; Gimeno 1999; Anand et al. 2009).

Firms can also create value through vertical M&A. If firms acquire distribution channels or service centres in the industry value chain, they can gain greater access to, and thus more information from, the end user. This forward vertical M&A enables firms to better serve customers' needs and preferences. If firms acquire their suppliers in the value chain through backward M&A, they can gain strong control of raw materials and production machines. As such, vertical M&A helps firms strengthen their control over value chain activities and create economic value. When firms face an intense rivalry in their markets, resource extension-oriented M&A can allow them to create value and avoid further competition (Mitchell 1989; Capron and Chatain 2008).

## Resource-Based View (RBV)

RBV researchers focus on the factors that create value in M&A. According to the RBV, a firm's heterogeneous and idiosyncratic resources are the basis of generating competitive advantages

(Penrose 1959; Wernerfelt 1984; Barney 1991; Conner 1991). The two characteristics of value-creating resources are ‘stickiness’ (Dierickx and Cool 1989) and ‘embeddedness’ (Granovetter 1985). These characteristics make it difficult for other firms to imitate a focal firm’s resources and at the same time make it difficult for the focal firm to sell the resources on the market (Teece 1982; Seth 1990; Capron et al. 1998). Given the absence of transaction methods to sell such resources (e.g., licensing), M&A can be used to trade the idiosyncratic resources. RBV emphasizes the ‘relatedness’ between buyer’s and target’s resources for value creation (Singh and Montgomery 1987; Anand and Singh 1997). Resource similarity indicates a degree of overlap existing between target firms’ and acquiring firms’ resources. A high degree of resource similarity enables acquiring firms to consolidate the target firms’ businesses easily (Henderson and Cockburn 1994), deepen product lines (Karim and Mitchell 2000; Anand and Delios 2002) and strengthen general marketing skills (Capron and Hullan 1999). However, some scholars find that excessive overlap between target firms’ and acquiring firms’ resources can also cause redundancy and thus lower M&A performance (Anand and Kim 2010). Other studies show an inverted U-shape relationship between relatedness and M&A performance (Ahuja and Katila 2001; Cloudt et al. 2006).

In addition, complementarity between target firms’ and acquiring firms’ resources can play a significant role in the value creation of M&A. If firms can acquire complementary resources through M&A, they can create synergistic gains as well as reduce overlapping resources (Harrison et al. 2001; Anand 2004; Kim and Finkelstein 2009; Anand et al. 2010; Makri et al. 2010). For example, firms with superior marketing skills can acquire content producers to leverage their downstream resources. By doing so, the firms can increase synergistic gains through M&A.

## Evolutionary Theory

The evolutionary theory suggests that M&A may enable firms to overcome existing constraints in

their organizations (Cyert and March 1963; Nelson and Winter 1982). Organizational inertia prevents firms from rapidly responding to exogenous environmental changes (Hannan and Freeman 1977) and reduces their survival rates (Anand and Singh 1997). Therefore, if M&A allows firms to alleviate organizational inertia and update their existing resources, M&A can create value (Capron et al. 1998; Anand 2004).

According to the evolution theory, the understanding of a target firm’s organizational culture and system is an integral component of value creation in M&A. In other words, acquirers must have pre-requisite knowledge on target firms’ routines and organizational cultures to create value from M&A. If acquirers do not possess absorptive capacities to codify target firms’ embedded knowledge (Cohen and Levinthal 1990; Anand and Singh 1997), they may not fully utilize opportunities afforded by M&A. In addition, post-integration and coordination problems also increase the cost of M&A. The necessity to integrate considerably different organizational cultures and routines between target and acquiring firms often results in financial burden for acquirers (Haspeslagh and Jemison 1991; Agarwal et al. 2012). High post-integration costs can also destroy target firms’ innovation skills (Ranft and Lord 2002; Puranam et al. 2006). In sum, the evolutionary theory not only shows possible mechanisms of value creation, but also shows potential negative aspects of M&A.

## Transaction Cost Economics (TCE)

The sources of value creation in M&A based on TCE are similar to those of RBV, but the two theories’ assumptions are significantly different. While the RBV assumes the firm-level isolating mechanism creates value in M&A (Lippman and Rumelt 1982), TCE emphasizes that M&A is justified given market hazards and opportunistic behaviour of buyers. Therefore, TCE is concerned about minimizing external market uncertainties and appropriability hazards (Williamson 1979). When appropriability regimes are weak, firms face high information asymmetry regarding

opportunistic partners (Teece 1986). In such cases, M&A can become a reliable option to eliminate market failures, and thus stabilize business through internalization. Internal capital market efficiency models also explain why conglomerate M&A can create value. Efficient internal markets for financial, human, technological and intangible resources can allow firms to maximize efficiency even if they acquire unrelated businesses (Myers and Majluf 1984; Chang and Hong 2002).

### Agency and Hubris Perspectives

Agency theory focuses on the difference between the interests of shareholders and managers (Jensen and Meckling 1976). In the absence of significant direct financial stake in the firm, managers may act in a risk-averse manner that favours conglomerate M&A (Amihud and Lev 1981; Jensen 1986) and emphasizes growth and survival of the firm over financial value (Anand 2004). This perspective, similar to the hubris perspective (Roll 1986), offers a reason why managers extensively use M&A despite the fact that M&A might result in economic losses. If M&A is primarily driven by the agency motives, therefore, possible economic losses are expected.

Agency issues may not be independent of resource-based factors – for example, firms with

greater agency problems are likely to overextend their resources into new markets, businesses, applications (Anand 2004).

### Conclusion

The aforementioned theoretical perspectives provide motives for M&A and mechanisms for value creation and competitive advantages. These mechanisms are summarized in Table 1. Although a large number of studies have identified value-creating or value-destroying factors in M&A, there are still some interesting unanswered questions. For example, from an IO perspective more systematic research would answer some interesting questions regarding how M&A in different markets can create conditions for tacit collusion. It may be interesting to study how rivalry in a focal market can affect a firm's M&A decision and its subsequent performance in other unrelated markets. In the RBV perspective, value-creating M&A strategies have been mainly concerned with relatedness or similarities between target's and acquirer's resources, but it would also be appropriate to study the conditions under which resource redundancy can destroy value. In the RBV, the lack of information on the value of target firms is driven by the isolating mechanism, preventing rivals' imitative attempts. However, the

**Acquisition Strategy, Table 1** Five theoretical motives for M&A and their corresponding strategies

	M&A motives	Value-creating M&A strategies
Industrial organization	Market power, economies of scale and scope, tacit collusion, mutual forbearance	Consolidation strategy
		Elimination of overcapacity
Resource-based view	Redeployment of existing resources into new opportunities	Redeployment strategy of existing resources
	Acquisition of knowledge base, R&D skills and complementary assets	Target selection strategy based on the relatedness between target and bidding firm
Transaction cost economies	Overcoming market failures	Value-appropriation strategy
	Cost-saving by pooling financial and human resources under transaction hazard environments	Internal financial and human resource management strategy
Evolutionary theory	Resolution of core rigidities through acquisitions of new capabilities and routines	Path-breaking routines and product extension strategy
	Acquisition of embedded learning capabilities	
Agency theory	Misalignments with shareholders' interests	Monitoring strategy of the unrelated M&A
		Disciplinary takeovers

insufficiency of information on targets can also create ‘lemon’ problems (Akerlof 1970) and market failures (Teece 1980). A better understanding of issues related to observability and opacity of target resources would help develop a better framework for RBV applications. In sum, the five perspectives have provided useful theoretical grounds of value creations in M&A. With the understanding of these mechanisms, we can expect more future studies to find sturdy evidence about value-creating M&A mechanisms.

## See Also

- ▶ Agency Theory
- ▶ Evolutionary Theory of the Multinational Corporation
- ▶ Industrial Organization
- ▶ Resource-Based View
- ▶ Transaction Cost Economics

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## Adaptive Aspirations

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### Abstract

This article discusses the history of the concept of adaptive aspirations, drawing on the origins of the term in the work on firm behaviour by Cyert and March. It discusses the fact that the process of adaptive aspirations is dynamic rather than static, drawing on the experience of organizations during a particular time period to formulate its future behaviour. There is discussion of the implications of this approach for the future of research and behavioural strategies, and a concluding section supplies some areas for future study in this area.

**Definition** Adaptive aspirations is the name given to the method by which organizations break down a process of continuous improvement into a series of discrete and measurable events which can be evaluated and revised in the light of the feedback received. It has proved to be a dynamic management tool that informs the behaviour of business organizations.

## Introduction

An important assumption in various theories of organizations is that organizations learn and adjust their behaviour in response to past experience (Simon 1955, 1956; March and Simon 1958; Levitt and March 1988; Lant 1992). Indeed, the behavioural theory of the firm (Cyert and March 1963) posits that organizations exhibit adaptive behaviour over time. A key element in the adaptive learning process of organizations is the aspiration level, or goal, which is generally defined as ‘the smallest outcome that would be deemed satisfactory by the decision maker’ (Schneider 1992: 1053) or a ‘reference point that is psychologically neutral’ (Kameda and Davis 1990: 56). Organizations use aspiration levels to simplify performance evaluation, by transforming a continuous measure of performance into a discrete measure of success or failure (March and Simon 1958; Cyert and March 1963; Levitt and March 1988). Organizations set and adjust aspiration levels in response to favourable and unfavourable feedback in accordance with simple decision rules (Cyert and March 1963). A series of independent, aspiration-level constraints are imposed on organizations by members of organizational coalitions.

## Determination of Aspiration Levels

According to Cyert and March (1963), organizational aspiration levels in a particular time period are a function of (1) organizational goals of the previous time period, (2) organizational experience with respect to that goal in the previous time period and (3) the experience of comparable organizations on the goal dimension in the

previous time period. This can be formalized as the following exponentially weighted average model:

$$A_t = \alpha_1 A_{t-1} + \alpha_2 P_{t-1} + \alpha_3 C_{t-1} \quad (1)$$

where  $A$  is the aspiration level,  $P$  is the performance of the organization,  $C$  is the performance of comparable organizations,  $t$  and  $t - 1$  are time subscripts and  $\alpha_1 + \alpha_2 + \alpha_3 = 1$ .  $\alpha_3$  reflects the organization’s sensitivity to the performance of competitors.  $\alpha_1$  and  $\alpha_2$  reflect the speed at which the organization adjusts goals in the face of experience.

Studies in the literature have categorized aspiration levels as either historical or social. Historical aspiration levels are based on the same organization’s performance ( $P$ ) and aspiration ( $A$ ). Both experimental and field studies provide evidence of historical aspiration levels (Lant and Montgomery 1987; Lant 1992; Mezias et al. 2002). By contrast, a social aspiration level reflects when a decision maker chooses a suitable reference group ( $C$ ) and observes its performance. Managers differentiate the reference set of organizations by discerning differences in organizational structure and operations while considering the availability and ease of observation (Porac and Thomas 1990; Reger and Huff 1993; Porac et al. 1995; Clark and Montgomery 1999). Previous literature typically uses the simple rule of taking the unweighted average performance of the members of the reference groups as the social aspiration level (Levinthal and March 1981; Fiegenbaum and Thomas 1988; Greve 1998). Most current research on adaptive aspirations has examined the effect of both historical and social aspirations (Herriott et al. 1985; Bromiley 1991; Greve 2003a; Miller and Chen 2004; Baum et al. 2005; Knudsen 2008).

## Adaptation Speed of Aspiration Levels

Aspiration levels are not static (Simon 1955, 1956) but rather can be adjusted to different speeds ( $\alpha$  in Eq. 1). Slow adjustments imply that the past experience casts a long shadow, while rapid adjustments imply that decision makers are oriented towards current conditions.

Hypercompetitive conditions, where the basis for competition and the strategic position of each organization constantly shifts (D'Aveni 1994), lead to a focus not on the organization's current position or capabilities but rather on its dynamic ability over time (Teece et al. 1997), which suggests that organizations adjust aspiration levels quickly. Other studies have shown that both individual decision makers (Lant 1992) and organizational units of large multinational companies adjust their performance goals slowly. Decision makers that adjust slowly have been found to accumulate higher wealth and lower ruin rates than those that adjust quickly (March 1988). Greve (2002) found that slow adjusters dominate in uncertain environments, as slow adaptation leads to decreased sensitivity to random fluctuations and avoidance of unnecessary, unmotivated and costly changes that take the organization off track. Hu et al. (2011) further suggest that the dominance of slower or faster adaptation depends on the risk preference functions and aspiration formulation models.

### Consequence of Attainment Discrepancy

The consequences of performance relative to aspiration levels on subsequent firm action are important to understanding the role of aspiration levels in organizational learning processes. The difference between actual firm performance and a firm's aspiration level is called attainment discrepancy (Lant and Montgomery 1987; Lant 1992). Much of the theoretical and empirical work on attainment discrepancies and performance feedback (Greve 2003a) has focused on a single reference point. The single reference point theory, which suggests that decision makers are risk-seeking below their chosen targets and risk averse above them is central to modern theories of individual and organizational choice (Cyert and March 1963; Kahneman and Tversky 1979; March 1988). Attainment discrepancies have been considered as consequential for motivating all types of firm behaviour, including business-level strategy (Greve 1998), firm risk-taking (Bowman 1982; Singh 1986; Miller and Bromiley 1990; Bromiley 1991; Wiseman and Bromiley 1996; Wiseman and

Gomez-Mejia 1998; Miller and Chen 2004), organizational learning (Greve 2003a), ► innovation (Greve 2003b, c), R&D search (Chen and Miller 2007; Chen 2008), product launches (Greve 2007), corporate acquisition strategy (Iyer and Miller 2008) and divestiture (Shimizu 2007).

Recent studies have challenged the single reference point theory. Empirical investigations of organizational choice indicate that organizational risk-taking behaviour changes significantly at the extremes of performance. Some research suggests that when decision makers are at a certain distance below their normal reference point, they shift their attention to the survival point (Lopes 1987; March and Shapira 1987, 1992) and become risk averse (Staw et al. 1981; Shimizu 2007; Iyer and Miller 2008). A few studies (Audia and Greve 2006) suggest the opposite: increasing threats to survival stimulate greater and greater risk-taking, presumably as an attempt to escape the threats (Bowman 1982; Gooding et al. 1996; Miller and Chen 2004). Another extreme case is when organizational performance is significantly above the original aspiration level. A positive association between very high levels of performance and increased risk-taking has been established (Singh 1986). The behavioural theory of the firm (Cyert and March 1963) suggests that the presence of slack resources enables firms to increase slack search through activities such as innovation (Nohria and Gulati 1996), organizational change (Kraatz and Zajac 2001) and expansion through acquisition (Iyer and Miller 2008). However, Miller and Chen (2004) found no support for the positive relationship between slack and risk-taking, despite using multiple measures for key variables. The investigation of the effect of the incorporation of changes in risk preference at extremes of performance on adaptive aspirations suggests important implications for researchers and managers (Hu et al. 2011).

### Implications for Organization and Strategy Research

Adaptive aspirations have long been recognized as significant to understanding subjective utility

and choice behaviour (Simon 1955, 1956; Siegel 1957; Selten 1998). Interestingly, research on adaptive aspirations is one of the very few organizational theories focused on decisions and decision makers. It is tightly connected to the business reality of goal-setting and goal pursuit. Specifically, it provides the potential to explain otherwise paradoxical behaviour, such as why firms with the same objective performance can have different shortfalls relative to goals and why firms with different shortfalls may take different subsequent actions. It shows that performance trends influence action, thus suggesting that organizational performance is no longer Markovian and that organizations have performance memory. The research highlights the importance of learning about politics, cognition and ► [decision-making](#) routines in organizations.

### Future Directions for the Study of Adaptive Aspirations

Contrary to the assumption that decision makers typically pursue a single organizational goal, firms, in fact, almost always have multiple conflicting goals (Cyert and March 1963) and multiple measures of performance (Kaplan and Norton 1996; Meyer 2002). Important questions for future research include whether, when and how managers allocate attention to divergent goals or measures. Cyert and March (1963) theoretically posit sequential attention as a mechanism for avoiding the conflicting demands of multiple performance goals. Furthermore, the current theoretical statements and empirical work have concentrated on the simpler rule of taking the unweighted average performance of the competitors as the social aspiration level (Fiegenbaum and Thomas 1995; Greve 1998). However, similarity judgements, information availability and strategy (Katila and Chen 2008) drive the heterogeneous choices of the reference group. Future studies may consider multiple reference group-setting strategies in adaptive aspiration models, including targeting the best performers, average performers and performers with satisficing outcomes. The effectiveness of different strategies might be context dependent. Future studies might also explore the effectiveness of

adaptation speeds ( $\alpha$ ). For example, the effectiveness of reference group-setting strategies and adjusting speeds may differ under various circumstances, with different levels of industry maturity, environmental turbulence, organizational complexity and so forth (Hu et al. 2011).

Another promising area involves the study of risk-taking as determined by performance relative to aspiration levels. The literature lacks consistency in explaining how attainment discrepancy drives ► [organizational behaviour \(OB\)](#). These mixed outcomes partially result from different processes of determining aspiration levels with different assumptions (Washburn and Bromiley 2011), different measures of key variables, such as performance and aspiration levels, and separated research contexts. A starting point could be to investigate adaptive aspirations under a more collaborate environment, such as using more consistent measures of performance and aspiration levels across different studies and applying multiple research methods, ranging from computational modelling and experimental studies to empirical studies.

### See Also

- [Aspiration Levels and Learning](#)
- [Decision-Making](#)
- [Innovation](#)
- [Organizational Culture](#)
- [Strategic Learning](#)

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## Adverse Selection

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**Definition** A market exhibits adverse selection when the presence of asymmetric information leads to a bias in the direction of low quality or, more broadly, poor performance in market outcomes.

An important assumption underlying the model of perfectly competitive markets is that the characteristics of a good are observable to all buyers

and sellers. In practice, information in a market is often held asymmetrically and individual agents may hold more information about the good being exchanged. A market exhibits adverse selection when the presence of ► **asymmetric information** leads to a decision or selection bias in the direction of low quality or, more broadly, poor performance in market outcomes. As emphasized by Yao (1988), perfectly competitive markets offer limited potential for developing ► **competitive advantage**. Thus, the phenomenon of adverse selection is important in strategic management and business models and ► **incentive design** because of the implications for firm and consumer behaviour in what are necessarily imperfectly competitive markets.

A few examples help to illustrate the range of application:

1. In the market for mortgage-backed securities or other collateralized debt obligations, the seller may have better information than prospective buyers about the quality of the underlying mortgages or assets.
2. A start-up inventor-entrepreneur seeking funding may have better information about the innovation than a venture capital investor.
3. The seller of a used car may have better information about the car's quality than a prospective buyer.

In such settings, informed agents make decisions based on their private information. This behaviour will often have a negative impact on uninformed market participants. Participants on both sides of the information asymmetry are led to adapt their behaviour, and incentives arise for informed agents to signal or disclose their private information and for uninformed agents to screen or sort informed agents.

The fundamental impact of adverse selection is that the market price for a good reflects the information asymmetry. Consider a simple version of the classic Akerlof (1970) adverse selection model in the used-car market. The quality  $q$  of each car is a random draw from the uniform distribution on  $[0,1]$ . Each owner knows the

quality of his/her car but this is not observable to any buyer. This asymmetry implies all cars must sell at a common price  $p$ . For simplicity, suppose that  $q$  is the reservation value of each current owner. With a known quality, a buyer would value the car at  $\alpha q$ ; assuming  $\alpha > 1$ , there are gains to trade.

If the price is  $p$ , only buyers with relatively low quality,  $q < p$ , would be willing to sell. Then  $q^c = 0.5p$  is the expected average quality of cars on the market. For a buyer, purchase yields an expected benefit of  $\alpha q^c = 0.5\alpha p$  and as long as  $\alpha < 1.5$  it is not worth paying  $p$  to buy a used car. The only market clearing price is  $p = 0$  and no cars are exchanged. Adverse selection leads to a complete market collapse in this simple example.

More generally, adverse selection leads to inefficient market outcomes. Unrealized gains to trade then provide scope for strategic action. In used-car markets, CarMax has emerged as a middleman offering warranties and certified inspections, as part of a strategy to establish a reputation for high quality (Biglaiser 1993). In labour markets, potential workers obtain (costly) education in order to signal high productivity to employers (Spence 1973). In insurance markets, such as those for cars and health care, contract terms include deductibles and co-payments as screening devices by insurers to induce informed customers to self-select among policies (Rothschild and Stiglitz 1976). An inventor may disclose his invention to a buyer who then offers a contract to keep the entrepreneur from selling it to others (Anton and Yao 1994). As the methodology has progressed, modern approaches to adverse selection problems often involve incentive contracts and mechanism design techniques that emphasize the fundamental role of information asymmetry.

## See Also

- ▶ [Asymmetric Information](#)
- ▶ [Competitive Advantage](#)
- ▶ [Incentive Design](#)

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## Advertising

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### Abstract

The following is an overview of advertising and its impact on markets and society. In general, advertising is one-way communication that is designed and transmitted by a sender to a receiver. The objective of the sender is to affect a decision that the receiver will make and this decision relates to issues which have direct impact on the sender. Advertising is observed to have two important roles. The first is creating awareness of the sender in terms of both recall and recognition. The second is to provide the receiver with detailed information that enhances her understanding of the situation. In markets, advertising can make prices go up or go down and for this reason there is significant controversy regarding the manner in which advertising works and its overall impact on society. There are models that reconcile these seemingly contradictory views of advertising. Nevertheless, the one-sided nature of

advertising messages and advertising clutter limit advertising's effectiveness. A trend of reduced impact is likely to increase over time.

**Definition** Advertising comprises the communication activities undertaken by organizations (or individuals) to transmit information, ideas and associations that assist the targets of advertising to take action that is of interest to the organization. In a commercial context, this generally entails firms transmitting commercial messages about products or services to potential and actual customers. Of course, many philanthropic organizations, the government and individuals also engage in advertising.

## Introduction

Advertising comes in many forms and is also delivered through an array of different channels. Traditional channels through which advertising is transmitted from companies to potential and actual customers include television (often short audio-visual presentations that are grouped in clusters during programmes), radio, outdoor (billboards, posters, backlights and signage) and print advertising. These channels are known as the media or media channels. In addition, advertising is now found in the electronic media (the Internet and social networks for example), the mobile phone market and in assorted multimedia contexts on digitally engineered screens (in sports venues, mass transit systems and in high traffic locations within buildings). In any advertising context, the advertiser develops the message (which is known as the creative side of advertising) and decides how to transmit this message to people (this is known as the media side of advertising).

## The Role of Advertising

It is generally agreed that the role of advertising is twofold. The first is to create awareness for a company's product or service, that is, when a consumer is aware of a company's product or service,

it means she knows the name of the product or is familiar with it. 'Top of mind' is the highest level of awareness a company can obtain: this happens when it is the first company (or brand) that comes to mind when the category is mentioned. Advertising is assumed to create awareness. The reason that firms use advertising to create awareness is that advertising is observed to be a key determinant of demand. Without advertising, consumers are uninformed and, in general, uninformed consumers do not become buyers of a product or service. This follows from behavioural research which demonstrates the role of consideration sets in a consumer's decision-making process. This literature shows that awareness is critical for a product to be included in a consumer's consideration set (Nedungadi 1990; Mitra and Lynch 1995). In addition, Dickson and Sawyer (1990) find that the average consumer spends less than 30 s making most grocery shopping choices. In these situations, the awareness of brands and their key attributes is an excellent predictor of brand choice. Empirical work by Kwoka (1993) also shows that the impact of advertising tends to be short-lived. This underlines the importance of ongoing advertising to create awareness.

The second important role of advertising is to provide information to consumers that relates to understanding the product or service in terms of both its physical characteristics and emotional characteristics ('what does the brand stand for?'). In many categories, the main source of information about products and what they stand for is advertising in the mass media. Ries and Trout (2001) argue that a key role of advertising is to create a position for a product (or service) in the consumer's mind. In other words, the marketer makes the consumer aware of the product and its key characteristics through advertising. In some categories, these characteristics are physical. In others, the characteristics are psychological (advertising creates a personality for the product).

## Advertising's Effect on Society

As highlighted by Tirole (1988), advertising is critical to competition. As a result, academic

research has committed significant effort to understanding its role and impact across markets. Most agree that the key role of advertising is to provide information to potential consumers yet there has been controversy regarding the nature of this information and advertising's ultimate impact on society. In this context, it is important to highlight two polar views.

The first (the 'partial view') supposes that advertising provides factual information to consumers allowing them to make rational choices. In other words, advertising provides information to consumers about the attributes (including price), quality and location of products. This view, first articulated by Telser (1964), suggests there is scarce evidence for anti-competitive effects of advertising in terms of pricing and profitability. The partial view argues that advertising tends to reduce product differentiation related to a lack of information. Studies in a number of industries (eyeglasses, pharmaceuticals and toys) have shown that prices were significantly higher in states where advertising was prohibited (Benham 1972; Cady 1976; Steiner 1973). This sanguine view of advertising emphasizes the benefits of advertising in terms of better-informed consumers and lower prices.

The alternative (the 'adverse view') suggests that advertising is designed to persuade (or fool) consumers into perceiving significant differences between products that are physically similar. This view, proposed as a counterpoint to the 'partial view', emphasizes the anti-competitive nature of advertising. Early references to this view of advertising are found in Bain (1956), Galbraith (1967), and Solow (1967). Comanor and Wilson (1974) suggest that advertising creates *spurious product differentiation* because the perceptions created by advertising lead consumers to pay premiums for products that are physically identical. Not surprisingly, numerous studies have been used to support this view of advertising by demonstrating a high correlation between advertising levels and prices (or profits) across a number of categories. These studies are referenced in Comanor and Wilson (1974), Popkowski Leszczyc and Rao (1990), and Carlton and Perloff (1994).

Both views suffer from shortcomings. The 'partial view' cannot explain the finding across many markets that higher advertising is correlated with high profits and prices. Nor is the 'partial view' consistent with certain circumstances (distributions of consumers that are discrete or non-uniform) that create a positive relationship between advertising and prices (see, for example, Meurer and Stahl 1994). In addition, a fundamental tenet of the 'partial view' is that advertising provides customers with information about the pricing of competing products. This is assumed to increase price competition and thereby reduce the welfare loss associated with pricing that exceeds marginal cost. Yet, apart from newspaper advertising, the vast majority of advertising does not contain pricing information. Not surprisingly, newspapers are a frequently cited medium for supporters of the 'partial view' (Tirole 1988). Pricing is notably absent from most television, radio, magazine and outdoor advertising and these are the primary media used by firms to advertise to consumers.

The 'adverse view' suffers from an inability to explain how *spurious differentiation* actually occurs. One explanation has been to suggest a distinction between informative (price-oriented) advertising and goodwill (image) advertising (Boyer 1974). Kotowitz and Mathewson (1979), Farris and Albion (1980), and Krisnamurhti and Raj (1985) also consider a dichotomous view of advertising. A suggestion in this literature is that goodwill advertising leads consumers to respond mainly to illusory differences between products. Yet if consumers are actually being 'fooled' one would think that they would realize it over time. The logical extension of this argument is that firms would no longer invest in advertising if consumers stopped responding to it.

There are theories that reconcile the two alternative perspectives of advertising discussed above. For example, Mitra and Lynch (1995) propose a model that explicitly recognizes the two roles played by advertising (creating awareness and providing specific information about products or services). In particular, the impact of 'knowledge about brand substitutes' is incorporated through the formation of consideration sets. The willingness of

consumers to pay more (for advertised brands) is captured by a 'strength of preference' construct. In a laboratory setting, the authors demonstrate that advertising can lead to higher or lower prices depending on how it affects both the formation of consideration sets and the strength of preference. This work provides insight about why people have such diametrically opposed views regarding advertising. Nevertheless, this work leaves unanswered the question of how advertising increases the strength of preference.

### **Advertising's Ability to Increase Preference for Products and Services**

The behavioural literature proposes several mechanisms by which higher advertising can increase the strength of preference including mere exposure, signalling and the role of 'irrelevant attributes' (Anand et al. 1988; Kirmani and Wright 1989; Carpenter et al. 1994). In the context of a specific market, it is unclear which of these mechanisms might apply. There are also economic models that explain advertising's role as a signal (Klein and Leffler 1981; Milgrom and Roberts 1986). In these models, advertising is positively associated with price yet the driver of the premium is quality which is signalled through advertising.

### **How the Human Mind Processes Advertising**

A well-known psychological model used to explain how advertising works is the Elaboration Likelihood Model of Petty and Cacioppo (1984, 1986). This model argues that consumer decisions need to be understood as a function of the consumer's involvement level in the decision. The model posits that communication (including advertising) works along '*central*' (important information directly related to how the product or service performs) and/or '*peripheral*' routes (information that is largely irrelevant to the performance of the product or service). Consumer involvement is defined in terms of the level of

engagement and active (mental) processing undertaken by the consumer to respond to a stimulus like viewing an advertisement (Kotler and Keller 2009: 174). In low-involvement purchase situations, a consumer makes the decision about buying relatively quickly and with little conscious thinking before-hand. In contrast, in high-involvement purchase situations, a consumer takes time to make the decision and gathers significant information prior to making the decision (Kotler and Keller 2009: 413).

For a high-involvement decision, information consumers obtain from advertising by the provider of the product or service is likely to represent one among many sources of information that influence the decision. However, central cues are found to be influential in a context of high-involvement decisions. In contrast, when consumers are engaged in low-involvement decisions, peripheral cues will be the most important factors in affecting consumers' decisions about purchase. These are cues which are not directly related to the product but are included in advertising messages nonetheless. Advertising that is driven by the provision of peripheral cues is often described as 'image-based advertising', 'lifestyle advertising' or 'transformational advertising'. The seeming tendency of people to be influenced by peripheral cues is largely responsible for the adverse view of advertising and accusations of 'spurious differentiation'.

There are a significant number of studies that raise concern about the ability of the Elaboration Likelihood Model to explain the effects of advertising (Alba et al. 1992). Nevertheless, it remains a benchmark to represent how the human mind processes advertising.

### **Advertising Today**

The growth of advertising and the reputation of advertising have led to diminished impact for advertising in today's world.

The high quantity of advertising today has created a problem of advertising clutter. According to a report in *The Economist* (26 June 2004), the average American consumer sees more



than 3,000 commercials per day. Kotler and Keller (2009: 282–287) report that the average consumer sees more than 300 commercials per day. Independent of which estimate one uses, it is clear that the average consumer sees many commercial messages daily. As a result, consumers develop the skill of screening out the commercials that are of no interest and process only those commercials that are of interest. Consequently, clutter diminishes the influence of advertising because many advertising messages do not reach the desired target.

The reputation of advertising is under attack due to stories of false advertising but also because of the lack of objectivity that pervades advertising (it is one-sided communication in which firms discuss the strengths of their products and not the weaknesses). As noted by Theodore Levitt in a 1993 *Harvard Business Review* article, ‘Everybody knows without help from Ralph Nader, that commercial communications are not engineering descriptions of the real thing.’ In fact, according to Levitt, people’s views regarding the trustworthiness of advertising are reflected by the typical parental response to a child who pleads for an irresistibly advertised toy, ‘Don’t believe it, it’s only advertising’.

These factors suggest a bleak outlook for advertising’s future. Researchers are even developing theories based on a reduced role for advertising. For example, the ‘weak theory’ of advertising suggests that the role of advertising is but to reinforce decisions that a consumer has already made (Hoek 1999).

## See Also

► [Market Power](#)

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## Agency Problems

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### Abstract

Agency problems arise from incomplete and asymmetric information as principals attempt to motivate agents to act in their interest. Incomplete and asymmetric information, conflicting incentives and imperfect monitoring can result in outcomes undesirable for the principal. The key to mitigating such problems is in the efficient design of incentive systems, broadly defined. Agency problems in business relationships are pervasive both within and between organizations and arise in relationships between employers and employees, shareholders and managers, and buyers and suppliers.

**Definition** Agency problems are problems that arise from incomplete and asymmetric information as principals attempt to motivate agents to act in their interest.

Agency problems arise when a principal (such as an employer or buyer) seeks to motivate an agent (such as an employee) to take action on the principal's behalf under conditions of incomplete and asymmetric information. Such problems stem from uncertainty on the principal's part concerning both an agent's actions (past or future) and an agent's type or attributes. Solutions to agency problems focus on crafting incentives in ways that induce behaviour desired by the principal or that induce agents to reveal critical hidden information. Agency problems occur wherever ► **principal-agent** relationships exist, including both within and between organizations.

Agency problems were noted as early as the eighteenth century: Adam Smith argued that directors of joint stock companies cannot be expected to watch over other people's money with the 'same anxious vigilance' with which private partners watch over their own (Smith, [1776] 1937: 700). Berle and Means (1932) later applied this logic to organizations, arguing that the growing separation of ownership and control in public firms was leading to a new age of inefficient organization. Scholars highlight two distinct problems of information asymmetry: hidden action, often referenced as ► **moral hazard**, and hidden information, often referenced as ► **adverse selection**. Early work by Akerlof (1970), Spence (1973), and Stiglitz (1975) advanced the problem of hidden information in markets. Work by Arrow (1971), Ross (1973), Jensen and Meckling (1976), Hölmstrom (1979), Fama (1980), and Grossman and Hart (1983) advanced theoretical work on the problem of hidden action.

### Hidden Action or Moral Hazard

Moral hazard is a problem of hidden action where asymmetric information and imperfect monitoring results in agents exerting effort on activities that benefit themselves at the expense of the principal. Such activities may include shirking, spending company time on personal projects, or minimizing effort on tasks where the outcome is unobservable to the principal. Moral hazard often arises when parties are insulated from the output

implications of their behaviour. The following canonical problem, called the ► **principal-agent problem** (Ross 1973; Hölmstrom 1979; Grossman and Hart 1983), provides the basic framework by which to understand problems of hidden action. A risk-neutral principal contracts with a risk-averse agent to provide the effort necessary to generate some output. The agent's effort is neither observable nor verifiable to the principal or an outside third party, such as the courts, and thus no contractual agreement can depend on effort. Because providing effort causes disutility for the agent, there is a fundamental misalignment of interests between the principal and the agent. In an effort to overcome this problem, the principal designs a contract that aligns the agent's interests with her own, such as contracting on some observable output. The trade-off in designing such a contract is between risk-sharing and incentives. If the principal decides to insure the agent against output uncertainty, such as by guaranteeing a wage, this action may destroy incentives and encourage the agent to take actions undesirable to the principal, such as shirking. However, high levels of risk may lead a risk-averse agent to reject the contract, or to minimize effort on activities (e.g., quality control) that do not directly impact on the measured output upon which pay is based. If a contract is accepted, the relationship ensues and the agent chooses a level of effort. The uncertainty of the output is then realized and wages are paid according to the contract.

There are many examples of moral hazard in business relationships. For instance, the inability of shareholders (the principals and owners of the firm) to directly observe the actions of the CEO (the agent) may result in the CEO making careless or self-serving decisions. Furthermore, as the results of such decisions are usually not immediate, and blame is often hard to assign, the CEO bears little comparative risk for the outcome. In employer–employee relationships, employers have limited knowledge about the difficulty of employee tasks and are often unable to observe and reward according to employee effort. Moreover, noise is added because employees have an incentive to understate their ability in order to prevent employers from ratcheting up

expectations. In corporate strategy, added distance from geographic expansion can increase the cost and difficulty of monitoring manager or employee effort at each individual branch. This can result in shirking or delivering sub-par effort, especially on unobserved outputs, such as customer service.

## Solutions to Hidden Action Problems

Two ways have been proposed to resolve the hidden action problem. The first is through increased monitoring of effort or actions. Monitoring allows the principal to directly observe the agent's behaviour and allows the principal to reward or punish accordingly. Yet monitoring is often either impossible or excessively costly. A second approach involves designing incentive systems or contracts that motivate agents to act in ways consistent with the desires of principals. This approach commonly involves compensating according to output (i.e., piece-rate pay, stock options or commissions), transferring a portion of the principal's residual claim to agents (i.e., franchising, equity ownership or profit sharing) or increasing the cost of undesirable behaviour (i.e., mandating the agent to post a bond or through increasing the fear of being fired). From a strategic perspective, firms, as principals, gain advantage as they craft more efficient means to induce optimal actions on the part of agents.

## Hidden Information or Adverse Selection

Another subset of agency problems revolves around inefficiencies due to hidden information, which lead to problems of adverse selection. The problem arises in market or exchange settings where information about the outputs or services to be procured is costly to extract. For instance, consider a firm that seeks to contract with suppliers of unknown capability, or a manager who has to hire employees of unknown ability, or a manager who has to choose among investment proposals from subunits with unknown future returns. Akerlof (1970) examines the used car

market to highlight the potential seriousness of the problem. Because the principal (in this case a buyer) cannot discern the quality of used cars, the buyer may offer to pay a price that reflects the average quality for a particular category or class of cars. However, agents, knowing the true quality of their individual cars, will choose to selectively withhold their cars from the market if the average price is below the value of their car, or sell if the average price is greater. Of course, this leaves only lower quality cars on the market. As a consequence, the buyer lowers the price to reflect this lower average quality, which in turn causes those sellers with higher quality (among the low-quality cars) to withhold their cars. This adverse sorting dynamic or adverse selection results in a market saturated with low quality and leaves essentially no market for high quality. A similar dynamic may play out in a variety of markets where the inability to discern quality results in an underprovision of high quality and an overprovision of low quality. For instance, in labour markets employers may presume that anyone looking for work is of low quality and discount accordingly, while those employed are of high quality. In capital markets, investors may presume that those investments looking for public capital are of low quality and accordingly discount, while those privately funded are of high quality.

### Solutions to Hidden Information Problems

Two broad resolutions to this problem are discussed in the literature. Sellers, buyers or agents who are of high quality can discover ways to signal their quality to the other party (Spence 1973). For instance, sellers may use guarantees or warranties to signal high quality, under the assumption that only sellers of high-quality products can afford such costly guarantees. Agents seeking employment may use investments in education, again under the assumption that education is less costly for high-quality agents. During an initial public offering, owners may choose to signal high quality by retaining

ownership of a large portion of the company. Alternatively, buyers, sellers or principals can attempt to use screens that induce sellers, buyers or agents to reveal their level of quality (Stiglitz 1975). For instance, a provider of insurance may use deductibles to screen and sort buyers into varying risk classes. Employers may use low-paying probationary periods to screen away those who are unlikely to perform well. From a strategic standpoint, competitive advantage is gained by efficiently luring the most attractive customers from competitors, or by finding clever ways to lure the most valuable talent.

### See Also

- ▶ [Adverse Selection](#)
- ▶ [Agency Theory](#)
- ▶ [Incentive Design](#)
- ▶ [Incomplete Contracts](#)
- ▶ [Moral Hazard](#)
- ▶ [Principal Agent](#)

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## Agency Theory

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### Abstract

Agency theory can be viewed as a special branch of the theory of incomplete contracts. Whenever one person is authorized to act on behalf of another, they are in an agency relationship: a special type of (implicit or explicit) contractual relationship wherein the latter is the principal and the former the agent. The agency relationship becomes interesting when there is information asymmetry between the principal and agent and monitoring actions or information is costly, so that perfect contracts cannot be written. Because of the pervasiveness of these conditions, agency theory can be used to examine a wide range of incentive problems in organizations and their solutions.

**Definition** Agency theory explores the nature and resolution of problems that arise when authority is delegated by one party (the ‘principal’) to another (the ‘agent’) – a relationship that is ubiquitous because of its potential to generate efficiencies, but also one afflicted by potential conflicts of interests between the contracting parties.

### The Agency Problem

As far back as 1776, Adam Smith called attention to the conflicts of interest between owners of joint-stock companies and their managers and directors. Smith’s pessimism about the ability of company owners to provide adequate oversight over directors and managers led him to conclude that the incentive problems in such companies were insurmountable, so that their survival was contingent upon being granted monopoly status by the state. Although history disproved Smith’s prediction of the demise of the corporate organizational form, two centuries later similar concerns were voiced by the lawyer-economist team of

Berle and Means (1932), who called attention to the potential problems that arise from the separation of ownership (by faceless atomistic shareholders) and control (by powerful managers) of US corporations. Berle and Means concluded that ‘there is no longer certainty that a corporation will in fact be run primarily in the interests of the stockholders’ (1932: 333) and urged for substantial regulation of securities markets. Notable in these works is their identification of problems that arise from conflicts of interest between self-interested parties and the attendant implications. These are the central issues addressed by the lens of modern agency theory, an influential branch of organizational economics.

Agency theory views the firm as a nexus of contracts among various stakeholders (such as shareholders, managers, workers, customers), each being motivated by self-interest. Following Alchian and Demsetz (1972) and similar to property rights theory, the essential nature of the firm is not the authority relationship between managers and employees (as proposed by transaction cost economics); rather, the firm is characterized by implicit or explicit contractual relationships between stakeholders who *ex ante* are assumed to have different goals (e.g., different preferences for effort and risk). Since the interests of the agent cannot be perfectly convergent with those of the principal under imperfect contracting, the principal incurs a ‘residual loss’. Agency costs include the costs of writing and enforcing contracts to attenuate the agency problem and the residual loss that arises since contracts cannot completely specify and enforce behaviour.

### Types of Agency Problems and Their Attenuation

Two distinct types of agency problems are those of ► **moral hazard** (Holmstrom 1979) and ► **adverse selection** (Akerlof 1970), appropriately termed by Arrow (1991) as the ‘hidden action’ and ‘hidden information’ problem respectively. Moral hazard is a post-contractual problem – the principal cannot be sure if the agent has desisted from ‘shirking’, that is, taking *any* action that



diverges from the interests of the principal (not only culpable cheating, but also negligence, oversight and incapacity). The dilemma posed by hidden action is a characteristic feature of numerous agency relationships in organizations – between managers and workers, shareholders and managers, minority and majority shareholders, partners in a common economic endeavour (such as joint venture partners), and even between top management and divisional managers who pursue ‘influence activities’ (Milgrom and Roberts 1990) to attempt to tilt decisions in their favour, generating a particular form of agency costs called ‘influence costs’.

As observed in Michael Jensen and William Meckling’s 1976 paper that is widely considered to be the foundation of modern agency theory, monitoring (accompanied by appropriate ► incentives) and bonding represent two broad classes of strategies that can be used to reduce the likelihood of shirking, depending upon whether the principal or the agent takes the lead. The principal may undertake monitoring activities to control the behaviour of the agent, including observation, measurement or verification of behaviour and associated compensation policies. Or, the agent may bond himself to guarantee that he will not take actions counter to the interests of the principal.

In contrast, adverse selection is a pre-contractual problem that arises because the agent has privileged access to information that the principal can only imperfectly observe. In the organizational context, adverse selection might occur when the principal cannot gauge if the agent (e.g., a job applicant or an entrepreneur taking his company public) accurately represents his quality. Milgrom and Roberts (1990) identify two classes of strategies to attenuate the adverse selection problem – screening and signalling – that depend upon whether the uninformed principal or the informed agent takes the lead. Screening refers to activities incurred by the principal to identify and sort out different types of parties according to relevant criteria. To do this, the principal offers agents a variety of alternatives. Agents then choose the alternative that is best for them so that they self-select into the

different types. For example, a compensation contract that is designed with a strong link between pay and performance tends to attract and retain highly productive employees. In signalling, the agent with private information incurs a cost to self-select himself into a category that communicates his type to the principal. For example, workers who know they are highly productive may choose to acquire a costly advanced degree as an observable and credible signal of their productivity.

## Governance Mechanisms

Strategy scholars have focused considerable research attention on governance mechanisms that mitigate various agency problems in organizations, in particular the shareholder-manager agency problem. Atomistic shareholders, whose wealth from their holdings depends on managers’ decisions, cannot observe the actions of the managers and can only imperfectly infer them from outcomes. In this setting, the corporate governance system acts to constrain managers’ discretion towards aligning their interests with those of shareholders. More broadly, the corporate governance system acts to align the interests of agents with those of principals in the variety of agency relationships that arise in organizations. Agency theory not only encourages but demands an explicit consideration of the institutional arrangements that comprise this system.

The corporate governance system is defined as the set of legal, cultural and institutional arrangements that determine what publicly traded corporations can do, who controls them, how that control is exercised and how risks and returns from the activities they undertake are allocated. These arrangements include rules and practices regarding property rights, ownership structures, the rights of various stakeholders, the market for corporate control, labour markets, capital markets, product markets, the role of the board of directors, capital structure, voting practices, accounting and control systems, performance measurement and executive compensation. These rules may be codified in law and regulation but also may prevail as

normal practice. These rules and practices represent the internal and external corporate governance mechanisms that align the interests of principals and agents in the public corporation. Clearly, governance systems can vary over time within a particular national context as well as vary across national contexts.

### The Structure of Agency Theory: Assumptions, Ontology and Logic

Although the assumption of rational self-interest on the part of agents is an essential assumption of agency theory, it is not *the* defining characteristic according to some scholars. As described by Michael Jensen,

The central proposition of agency theory is that rational self-interested people always have incentives to reduce or control conflicts of interest so as to reduce the losses these conflicts engender. They can then share the gains. Moreover, the theory provides a general structure to point the way to a variety of classes of solutions to these problems. (Jensen 1994: 13)

The value-maximization principle underlies the logic behind this proposition: both principal and agent will be motivated to minimize agency costs since, with a greater amount of total gain, it is possible to distribute it so that everyone is better off. A critical assumption of value-maximization is that the governance system representing the contracting environment can detect shirking and impose appropriate penalties (e.g., via devaluation of the agent's human capital and downward wage revision) so that the agent bears the costs of shirking (Fama 1980). Given the high probability of this '*ex post* settling up', the gains from interest alignment will be shared between the principal and the agent.

Jensen (1994) distinguished between two strands of the agency literature that both utilize this logic but follow different approaches to investigate contracting problems. The '► **principal-agent**' or 'normative' stream is oriented towards mathematical analyses of the agency problem in an abstract setting, often with highly restrictive models that did not easily transform to empirical analyses. In contrast, Jensen

identified the 'positive agency theory' stream as more empirically oriented towards identifying and describing the nexus of contracts observed in organizations. More recently, mathematical modelling approaches have increased in their sophistication (e.g., with the inclusion of dynamic models) and ability to incorporate the nuances of real-world settings. In the light of these changes, there is an increasing convergence in fields such as finance and economics between mathematical modelling approaches to predict equilibrium outcomes and empirical investigations of these predictions. Since both approaches affirm the value-maximization principle with shirking constrained by the governance system, I describe them as the 'semi-strong form efficient' version of agency theory.

However, agency theory subsumes an alternative stream (as exemplified by Adam Smith's perspective) wherein the governance system is 'weak form efficient' in constraining managerial discretion, so that agents may indeed *ex post act* selfishly to maximize their own utility at the expense of principals without regard to the value-maximization principle. Note that in both streams, principal-agent contracts are *ex ante* optimal. The critical difference is a lower probability of *ex post* settling up in the 'weak form efficient' stream arising from deficiencies in the governance system in detecting shirking and/or inadequate incentives to desist from shirking. So, the residual loss is higher in the 'weak form efficient' version than in the 'semi-strong form efficient' version. Marris (1964) termed this stream of agency theory as 'managerialism'. Both streams of agency theory have the valuable potential to inform and guide organizational action and public policy, particularly in the current economic environment.

To illustrate, take the hotly debated question of ► **ceo compensation**. The 'semi-strong form efficiency' version of agency theory would predict that that CEO compensation structures efficiently minimize agency costs with low residual loss (relative to 'weak form efficiency'), so that CEOs do not shirk in general. The 'weak form efficient' version would predict that CEOs overpay themselves in those circumstances when the benefits available to them outweigh the costs in a

governance system that is inadequate to constrain their discretion. Although the streams yield different predictions, they share the analytical approach of examining the cost–benefit trade-off of mechanisms to align principal-agent interests in a nuanced governance system. Of course, other approaches may also be used to explore corporate governance issues such as CEO pay. For example, Bebchuk and Fried (2004) argue that CEO compensation is flawed because of the power that CEOs have over the pay-setting process. Such a theoretical structure does not derive from agency theory, since it merely borrows the assumption of self-interested agents without regard to its analytical core of rational actors whose behaviour is influenced by the specific contracting environment.

## See Also

- ▶ Adverse Selection
- ▶ Agency Problems
- ▶ Asymmetric Information
- ▶ CEO Compensation
- ▶ Incentive Design
- ▶ Incentives
- ▶ Incomplete Contracts
- ▶ Moral Hazard
- ▶ Principal Agent
- ▶ Property Rights and Strategic Management
- ▶ Theory of the Firm
- ▶ Transaction Cost Economics

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## Alliance Capability

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### Abstract

Despite the popularity of ▶ [strategic alliances](#), many ▶ [alliances](#) underperform. Performance variation is partially attributed to inter-firm differences in alliance capability. A firm with extensive partnering experience and a dedicated alliance organization can develop alliance capability to effectively initiate, develop and maintain collaborative relationships with alliance partners. This entry offers an elaborate definition of alliance capability and explains its constituents and contribution to individual alliances and the alliance portfolio. Antecedents and consequences of alliance capability are identified, underscoring implications for strategic management research and practice.

**Definition** Alliance capability is a firm’s ability to effectively initiate, develop and maintain collaborative relationships with alliance partners.

## Alliance Capability: Background and Constituents

► **Strategic alliances** are commonly used, but approximately half of them underperform (Spekman et al. 1998). Besides considerations such as strategic fit of partners and the strength of their relationship, alliance performance can be attributed to firm-level practices and skills (Anand and Khanna 2000). Some firms manage ► **alliances** more successfully than others by virtue of their alliance capabilities. Alliance capability, also known as alliance management capability or relational capabilities, refers to a firm's ability to effectively initiate, develop and maintain collaborative relationships with alliance partners. Organizational capabilities enable firms to integrate, combine and deploy resources through distinctive organizational processes in order to achieve desirable outcomes. Capabilities consist of routines, which are persistent patterns of organizational procedures (Nelson and Winter 1982). Specifically, an alliance capability pertains to organizational processes for selecting partners, initiating relationships, negotiating agreements, structuring and governing alliances, adapting and terminating them. These processes enable effective management of individual alliances and the entire alliance portfolio.

An alliance capability supports efforts to manage individual alliances by proactively articulating, codifying, sharing and internalizing alliance management know-how (Zollo and Winter 2002). A firm can access such know-how by articulating its partnering history, analysing it, and codifying best practices in guidelines and documentation that support alliance management decisions. Alliance management know-how can then be disseminated via an informal exchange among managers and formal committees, task forces, mentoring and training programmes (Kale et al. 2002; Kale and Singh 2007). To be effective, deliberate learning should be instituted using a dedicated organizational function, managerial tools and practices (Heimeriks and Duysters 2007). The alliance management function involves a centralized alliance organization with a vice-president, director and professional alliance specialists. Alliance

management tools include training programmes and best practices for partner selection and relationship assessment, conflict resolution procedures, knowledge-sharing routines, incentive programmes for alliance managers, a partner database, alliance case studies, and various metrics and forms (Kale et al. 2002). Some firms also rely on consultants, lawyers and other external experts to supplement their alliance management function (Heimeriks et al. 2009).

Besides learning, an alliance capability entails effective coordination, communication and bonding processes (Schreiner et al. 2009). It enables a firm to build a consensus with partners, specify roles and tasks for execution, access and exchange relevant knowledge via formal and informal communication channels, and promote social interaction with partners. An alliance capability can thus assist in nurturing mutual trust, sharing knowledge, accessing complementary assets, establishing informal safeguards, and engaging in joint problem-solving and conflict resolution (Dyer and Singh 1998; Reuer et al. 2002), which contribute to value creation in alliances (Simonin 1997; Kumar and Nti 1998; Madhok and Tallman 1998). Nevertheless, to promote these relational mechanisms, both partners must develop alliance capabilities.

Most firms engage in multiple alliances, so an alliance capability should support the entire alliance portfolio. Alliance formation decisions are often derived from the firm's corporate strategy, so the alliance capability can serve for effectively designing the alliance portfolio and guiding partner selection policies. An alliance capability also entails effective monitoring and adaptation of the alliance portfolio in accordance with the firm's changing strategy. It involves coordinating the firm's operations across interdependent alliances with the aim of eliminating redundancies and creating synergies among alliances (Hoffmann 2005; Lavie 2009).

## Antecedents of Alliance Capability

Scholars have underscored the roles of partnering experience and a dedicated alliance function in

developing an alliance capability. Early research has revealed the direct effect of these antecedents on alliance performance. It has shown that accumulated partnering experience is positively related to value creation in alliances (Anand and Khanna 2000), yet this value increases at a decreasing rate (Draulans et al. 2003; Hoang and Rothaermel 2005). Moreover, experience with the same partner is more valuable than general experience with various partners (Gulati et al. 2009). Additionally, a firm with a dedicated alliance organization achieves superior alliance performance (Kale et al. 2002). More recent research has suggested that an alliance capability mediates these effects (Kale and Singh 2007; Schilke and Goerzen 2011), so that the firm's partnering experience and alliance organization facilitate the emergence of an alliance capability that in turn enhances alliance performance.

Partnering experience assists in developing routines for managing alliances. Recurrent engagement in alliances serves as the basis for tacit knowledge and codified procedures for partner selection, alliance formation and the governance of alliances (Simonin 1997; Rothaermel and Deeds 2006; Gulati et al. 2009). A firm that has engaged in numerous alliances can avoid certain pitfalls and identify best practices that enhance the efficiency of learning (Levitt and March 1988). Its partnering experience can facilitate internal coordination and specialization of alliance personnel (Hoang and Rothaermel 2005), which contribute to its alliance capability.

Establishing a separate organizational unit for managing alliances contributes to the accumulation, integration and dissemination of alliance management know-how. This dedicated alliance function facilitates learning from partnering experience (Draulans et al. 2003; Kale and Singh 2007) by codifying know-how, formalizing routines and disseminating tacit knowledge to managers. The dedicated alliance function makes alliances more visible to stakeholders, promotes accessibility of internal resources and corporate support, and institutes monitoring and evaluation of alliance performance (Kale et al. 2002). Hence, a dedicated alliance function formalizes alliance management practices and

supports the alliance capability throughout the alliance life-cycle.

## Performance Implications of Alliance Capability

Scholars contend that an alliance capability enhances alliance performance by improving alliance management practices and promoting exchange of complementary assets, knowledge-sharing, coordination, specialized investments and effective governance of alliances (Dyer and Singh 1998; Lorenzoni and Lipparini 1999). Nevertheless, empirical research is scarce, furnishing mostly indirect evidence on the performance effects of partnering experience and the dedicated alliance function. Some studies have demonstrated how the interplay of partnering experience and alliance management practices contributes to the success of alliance (Draulans et al. 2003; Heimeriks and Duysters 2007; Heimeriks et al. 2007). Others suggest that the performance effect of prior partnering experience depends on the type of alliance or availability of complementary assets (Rothaermel and Deeds 2006; Gulati et al. 2009). Only a few studies have corroborated the direct effect of alliance capability on alliance performance (Schreiner et al. 2009; Schilke and Goerzen 2011), with some demonstrating how specific alliance management practices contribute to alliance performance (Heimeriks et al. 2009). These studies rely on managerial assessments of alliance performance, occasionally aggregated to the firm level. Further research is needed to establish the effect of an alliance capability on corporate performance and distinguishing firm-specific from partner-specific constituents.

## See Also

- ▶ [Alliances](#)
- ▶ [Capability Development](#)
- ▶ [Inter-firm Cooperation](#)
- ▶ [Inter-organizational Learning](#)
- ▶ [Research and Development \(R&D\) Alliances](#)
- ▶ [Strategic Groups](#)



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## Alliances

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### Abstract

Since the 1990s, alliances have become a common business practice in many industries, primarily in response to ► [globalization](#) and technological change. More relaxed regulations on competition have further favoured the formation of alliances. Many alliances associate firms competing in the same industry but in different geographies. In addition to the pursuit of explicit economic objectives (notably achieving economies of scale and leveraging complementary capabilities), alliances create opportunities for learning new skills from partners and fighting off competition. However, alliances are rarely optimally efficient arrangements because partners are

torn between the will to cooperate and the temptation to behave opportunistically. The main pitfall in alliances is to strengthen competitors through unintentional capability transfers to partners.

**Definition** Alliances are inter-firm arrangements in which firms pool their resources to undertake cooperative activities, while retaining full autonomy with respect to all other activities. Some alliances have a limited scope (e.g., pooling R&D efforts); others encompass a whole business unit. Alliances can be governed through equity joint ventures or non-equity contracts.

Alliances are inter-firm arrangements through which partner companies combine skills and resources to research, develop, produce and/or market products and services. Allied firms share decision-making authority on joint activities while remaining independent in all those activities that fall beyond the scope of the alliance. Some alliances are limited to pooling R&D efforts or marketing a partner's product; others encompass the whole value chain, from product development all the way to sales. Many alliances associate firms competing in the same industry and most involve some degree of exclusivity: the partners commit to not competing directly with alliance activities. Some alliances lead to the creation of equity ► [joint ventures](#), but other arrangements are also used, including non-equity contracts or acquiring a minority stake in a partner's equity.

## The Rise of Alliances

Since the 1990s, alliances have become widespread, because of ► [globalization](#), technological change and a certain relaxation of competition law. Globalization has opened up previously closed domestic markets to worldwide competition, thereby giving companies an incentive to form international alliances. Technological progress has resulted not only in soaring R&D costs, but also in a drastic reduction in product life cycles. In order to successfully address this two-pronged challenge, firms need to secure adequate returns on

increasingly large investments in ever-shorter periods of time. They form alliances both to share development costs and to gain access to the largest possible market as fast as possible. Finally, in many countries, anti-trust authorities have begun to adopt a more tolerant attitude towards alliances, which they had previously suspected of being a form of anti-competitive ► [collusion](#). For example, in 1984, the US Congress approved the National Cooperative Research Act (NCRA), which allows competing firms to cooperate in order to develop new technology.

Cooperating with other companies – sometimes with rival companies – has become standard behaviour when the aim is to reduce costs, ease the burden of investment, innovate, gain access to new technology or increase the global reach of corporate activities. For example, Nestlé and General Mills formed the Cereal Partners Worldwide alliance in the early 1990s. Despite their different origins and geographic coverage (Nestlé is based in Europe, while General Mills has traditionally focused primarily on the United States), the two firms compete in several fields, including dairy products, biscuits and prepared meals. Their alliance focuses on breakfast cereals, with products such as Weetos, Golden Grahams, Cheerios, Chocapic, Nesquik and Fitness. It covers all markets around the world except the United States, where General Mills continues to operate on its own. Although it is a very large-scale alliance, it has not led to a merger or to any significant exchange of equity between the two corporations. To implement it, the partners merely decided to coordinate the necessary skills and resources, with each of them relying on the strengths of the other: General Mills put in most of the product and marketing know-how; Nestlé, meanwhile, contributed its manufacturing facilities and, more importantly, access to distribution networks, notably in Europe. The products marketed by the alliance are essentially the same as those in the General Mills range in the United States. The only notable difference is that the packaging bears the Nestlé signature. The Cereal Partners Worldwide alliance is considered a success by both sides. The first profits were recorded in 1999, one year ahead of schedule, and growth has continued unabated since.

From an economic point of view, strategic alliances aim at leveraging synergies between partner firms, such as cost synergies based on economies of scale or revenue synergies based on complementary capabilities. Economic objectives often combine with other, more strategic, goals, such as learning new skills and fighting off competition (Dussauge and Garrette 1999).

### Scale Economies

Alliances offer some of the scale advantages that usually arise from industry concentration, without the constraints of mergers and acquisitions. European aerospace and defence firms have formed alliances since the 1950s because these activities are particularly sensitive to scale economies, while also being subject to national independence requirements, which limit opportunities for international consolidation. In such a context, alliances make it possible to reach a critical size while avoiding mergers. Even without political pressure, in industries in which achieving a minimum efficient scale at some points in the value chain is critical, competitors form alliances to pool their volumes and thereby increase efficiency. For instance, chemical firms invest in jointly owned plants to produce intermediate products that require very large volumes. Likewise, car manufacturers create joint factories to produce engines. In such circumstances, alliances may be preferred to mergers because the need for collaboration is confined to a subset of the overall activity.

### Complementary Capabilities

Firms can combine complementary skills and assets through alliances in order to create new businesses or improve the performance of existing businesses. This is often the case in alliances between companies that are not direct competitors, but operate in related industries or in different geographies, like in the above-mentioned Nestlé–General Mills alliance.

### Learning

Alliances are a highly effective tool when it comes to gaining access to skills that are not available on the market. Indeed, tacit or organizational know-how cannot easily be transferred by entering into technology transfer agreements or by poaching key people. Doz et al. (1989) analyse alliances as being a disguised form of competitive confrontation in which, often under the guise of collaboration, one of the partners is deliberately arming itself to weaken the other, as in the legend of the Trojan horse. According to these authors, learning and skill transfers are the weapons in this silent conflict. Each partner seeks to learn from the other and thus steal their most strategic skills, to be used against them at a later date.

### Fighting Off More Powerful Competitors

Alliances are a means for competitors in a position of weakness to form coalitions to collectively improve their competitive position. The Airbus alliance allowed European companies to survive in the face of Boeing's dominant position in the commercial air-craft business. It should be noted that such defensive strategies may have anti-competitive aspects that can be illegal. Competitors who feel threatened by changes in their industry may form cartels under cover of strategic alliances, in order to raise prices or put up artificial entry barriers. The difference between a strategic alliance and an anti-competitive agreement is not always obvious, which is why antitrust authorities keep alliances under close scrutiny.

Managing alliances is a complex process that creates significant challenges for the partner firms and managers involved.

### Under-Leveraging Synergies

Alliances are rarely optimal arrangements in terms of efficiency. Each partner tends to protect its assets and capabilities, which limits potential rationalization. To reach a mutually acceptable compromise, duplication is often permitted to

subsist for some tasks, thus limiting scale economies and increasing the required investments. Most of the cooperation programmes in the European defence industry are organized in such a way that the final assembly of jointly developed equipment is carried out simultaneously in several countries by each of the involved partner firms. In fact, none of the partners wants to give up final assembly of the full system because that would mean losing their status as a first-tier supplier in the eyes of their national armed forces. As all the partner-firms in the alliance behave in the same way, they come to a tacit agreement to duplicate this operation, even though it increases overall costs.

### The Prisoner's Dilemma

The fundamental problem in cooperation is that partners are constantly torn between the will to cooperate, which generates costs but enables them to benefit collectively from the alliance, and the temptation to behave as a free rider and profit from the partner's contributions while avoiding investing themselves, thereby making gains at the expense of their partner. The resulting ambiguous behaviour depends very largely on the way in which each partner expects the other to behave. Merrill Ford formalized this problem in 1951 using a game theory framework known as the '► [Prisoner's Dilemma](#)'. The dilemma refers to the situation of a prisoner hesitating over the deal put forth by the police: to betray an accomplice in exchange for freedom. Should I 'betray' my accomplice or keep silent in the hope that he will too and that, as a result, neither of us will be charged because of lack of evidence? It is a difficult issue as it all depends on the accomplice's loyalty: if the other speaks first, the first prisoner will be charged and it will be too late to talk. In fact, the only solution to the dilemma is for the cooperation to last long enough for the partners to educate one another and to develop trust (Axelrod 1984). Trust then leads to the partners giving priority to the common objectives they can achieve together over their respective particular objectives that could be achieved only at the expense of the other.

### Creating or Strengthening a Competitor

The learning process that we presented as an advantage of alliances can turn into a dangerous trap: with my partner gaining access to my technologies, my know-how and my network of distributors and suppliers, am I not losing out? In time, is my partner not going to become a threatening competitor? The examples of alliances that turn into confrontations between competitors after a few years are many. Chinese firms, for example, appear to have formed alliances with foreign multinationals with the deliberate goal of learning, acquiring technologies and commercial know-how. Chinese manufacturers are now capable of competing with their partners on markets where the latter had thought they were safe. As Chinese authorities have traditionally been lenient on matters of intellectual property and unfair competition, some of these alliances have turned into open conflict. Once the learning process is complete, initial cooperation turns into unbridled competition. The Prisoner's Dilemma is no longer much of a dilemma for the partner who has acquired the other's skills: it becomes perfectly obvious that that partner no longer has any interest in cooperating.

It is therefore essential to protect key capabilities when cooperating. On the other hand, the wish to protect against unintentional skill transfer encourages each partner to reduce its exposure, filter information and deprive the alliance of its most advanced knowhow, thereby derailing the efficiency of cooperation. Finding the right balance between protection and transparency is difficult: too little cooperation will hinder the achievement of synergies while too much transparency may weaken the position of the more loyal partner.

### See Also

- [Collusion and Cartels](#)
- [Economies of Scale](#)
- [Globalization](#)
- [Joint Venture](#)
- [Prisoner's Dilemma](#)

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## Andrews, Kenneth (1916–2005)

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Kenneth R. Andrews (1916–2005) was a professor at Harvard Business School (HBS) from 1946 to 1986. He received a BA from Wesleyan University and his PhD from the University of Illinois at Urbana. The Second World War interrupted his doctoral studies in English Literature. He was drafted in 1941 and became Head of Analysis and Commanding Officer in the Air Force's Statistical Control Unit. While in the service, Andrews was responsible for personnel classification and assigned officers to the statistical school at HBS during the war. After the war, at the invitation of Edmund P. Learned, Andrews joined the HBS in 1946 as an instructor in multidisciplinary courses. During this time, he also completed his doctoral thesis about Mark Twain which was published in 1950 by Harvard University Press as *Nook Farm: Mark Twain's Hartford Circle* (Harvard Business School Archives).

Andrews is best known for his work concerning business strategy and also for his co-authored textbook *Business Policy: Text and Cases*, which first appeared in 1965 (with Learned, Christensen, Andrews and Guth) and was later published in various editions. Andrews and his colleagues developed the concept of strategy as the organizing principle of the business course at HBS, which was reflected in the seminal casebook, including Andrews' landmark

study of the Swiss watch industry (Learned et al. 1961: 3–140).

Andrews' work was more practical than theoretical in its orientation, being focused on the management of the firm. Andrews remarked that his 'career as a teacher, researcher, and consultant ha[d] been focused on the education of practicing executives to direct their attention to the need for defining the purposes of their own lives and those of their organizations, and to the fact that such purposes should be worth pursuing in terms of profit outcomes and social responsibility' (quoted in Moulton 1995: 75). His way of helping managers was to provide a 'conceptual framework for thinking about the problems that confront the general manager, breaking his problems down into more manageable units, and proposing a sequence in which they might be reasonably ranked and considered' (Bower et al. 2011: 3).

In the spirit of Chandler's *Strategy and Structure* (1962), Andrews' framework emphasizes the appraisal of external and internal conditions, which lead to the attainment of *fit*. An internal appraisal uncovers the strengths and weaknesses of the organization (SW), while external appraisal involves the exploration of the external environment to identify opportunities and threats (OT). Andrews' ideas on strategy are also echoed in Philip Selznick's *Leadership in Administration* of 1957, in which the notion of the 'distinctive competence' (42–56) of an organization was discussed (Rumelt et al. 1994). Analysing fit between internal capabilities and external conditions is well known as ► [SWOT analysis](#).

However, for Andrews, narrow economic criterion are insufficient to evaluate a strategy: SWOT is not strategy. Rather, the strategist needs to consider what a firm stands for and what its leadership cares about because a winning strategy needs to resonate with top managers' values, in part because the success of the strategy depends upon their personal commitment (Bower et al. 2011: 4). Andrews defined strategy as 'the pattern of objectives, purposes, or goals and major policies and plans for achieving these goals, stated in such a way as to define what business the



company is in or is to be in and the kind of company it is or is to be' (1965: 15). He argued that, 'The determination of strategy also requires consideration of what alternative is preferred by the chief executive and perhaps by his immediate associates as well, quite apart from economic considerations. Personal values, aspirations, and ideals do, and in our judgment quite properly should, influence the final choice of purposes. Thus, what the executives of a company want to do must be brought into the strategic decision... Strategic choice has an ethical aspect – a fact much more dramatically illustrated in some industries than in others. Just as alternatives may be ordered in terms of the degree of risk that they entail, so may they be examined against the standards of responsibility that the strategist elects' (Andrews 1971: 38).

## See Also

► [Swot Analysis](#)

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## Ansoff, H. Igor (1918–2002)

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### Abstract

H. Igor Ansoff was the prominent reference in the ► [corporate strategy](#) field, especially during the 1960s and 1970s. His bestselling *Corporate Strategy* was the first book to give a conceptual framework and tool box for top managers, consultants and scholars. Recognized as a pioneer in the field, Ansoff was also seen as the leader of the ► [strategic planning](#) school.

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This prominent influence over a period of 20 years was linked with the worldwide acclaim for *Corporate Strategy*. Published in 1965, and his first book, it remains, 45 years later, a classical reference for many scholars, even if the author is mainly seen as the leader of 'the strategic planning school', as accredited by Mintzberg (1994).

But if 'strategic management' is now the official flag of the academic community in the field, few scholars remember that H. Igor Ansoff was also, in 1973, the author of this designation; and that he has produced the vision and the main concepts to enlarge strategic planning and to link strategy, organization and management.

The 'first Ansoff' can be seen as the father of corporate strategy's main concepts and tool box. Until the publication of his book, the domain consisted only of business cases teaching, using the wide-ranging 'SWOT model' of Harvard professors Learned et al. (1965), the three levels process of decisions (strategic, administrative,

operational), the objective system, the concepts of synergy and competencies profile, the matrix products x markets, the generic strategies and the growth vector, the portfolio analysis.

In Ansoff's first book, strategy analysis and formulation were based on a strong framework, relevant for complex situations. In fact, Ansoff was deeply convinced that deliberate strategies are necessary to achieve long-run performances and targets. But he designed a research programme and a conceptual framework to introduce flexibility in the procedures and to enlarge the scope of strategic planning, under the new name of 'strategic management' (Ansoff 1984).

He spent the decade from 1973 to 1983 in Europe, at the European Institute for Advanced Management Studies (EIASM) in Brussels and at the Stockholm School of Economics. During this period Ansoff produced an impressive set of concepts and tools, laid out in two books: *Strategic Management* (1979) and *Implanting Strategic Management* (1984). The whole framework is a systemic approach to prepare organizations to be more proactive, to anticipate events, to avoid unwanted surprises and to link strategy, structures and management systems.

It is particularly interesting to read these two books again during these times of financial and governance crisis. Ansoff was explicitly engaged against Milton Friedman's famous position – profit for shareholders only – and aimed to promote a stakeholder theory of governance and strategic management. For him, economic calculus must always be challenged by political processes in and around the firm to produce sustainable development in the long run to the benefit of all stakeholders.

We should not forget that Ansoff was brought up and lived in the USSR during his first 18 years, although he graduated in engineering and received his Ph.D. in Applied Mathematics at Brown University, Rhode Island. He was also keen to live and work in Europe, where he wanted to see something more complex and challenging. During his long international career he worked as planner, chief executive officer, consultant, teacher and researcher. He began to write *Corporate Strategy* during his last year as Vice-

President of Lockheed Electronics, before joining Carnegie Mellon University, where he remained for 5 years. He left this outstanding university to become founding dean of a new business school in Vanderbilt University, Nashville. Then, a few years later, he crossed the Atlantic Ocean to direct European Ph.D. students. In 1983, he returned to the US, to the far south-west coast, as Distinguished Professor at United States International University, San Diego.

An appreciation of his rich life gives us some keys to understanding his research interests and views. As he explained in his book *Strategic Management*, he believed in systemic approaches and design effort, against analytical reduction and positivism which dominate the field in the US business schools. According to Ansoff, we must go from particular cases to generic propositions and feed back; we need to practise abduction, conception and imagination. But we also have to produce an axiomatic and conceptual framework as grounded guidelines for action.

## See Also

- ▶ [Business Policy and Strategy](#)
- ▶ [Business Strategy](#)
- ▶ [Competitive Strategy](#)
- ▶ [Corporate Strategy](#)
- ▶ [Exploration and Exploitation](#)
- ▶ [Strategic Decision-Making](#)
- ▶ [Strategic Planning](#)
- ▶ [Strategies for Firm Growth](#)

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## Appropriability

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### Abstract

Appropriability is the degree to which the social returns to innovation can be privately appropriated. Strong appropriability is seen as a prerequisite for continued investment in R&D. The economic study of appropriability has focused on intellectual property rights and market share as the mechanisms by which firms can increase the likelihood of capturing the benefits of innovation. The strategic management literature has augmented the economics perspective by pointing out that firms in any industry are potentially able to enhance the appropriability of their innovations by positioning astutely with respect to ► **complementary asset** that are necessary to commercialize innovations. Survey results confirm that firms pursue a variety of methods beyond patents, such as secrecy or ► **first mover advantage**, to improve appropriability.

**Definition** Appropriability is the degree to which the social benefit created by an activity, particularly an innovation, can be captured by the organization conducting that activity, given the conditions of the business environment in which it operates.

At the most general level, appropriability is the degree to which the value added by an activity can be captured by the organization conducting that activity. Consider, as an example, the addition of a safety warning on a product that poses a risk when used improperly. The warning may prevent injury

or death, to which some monetary value could be assigned. But if the presence of the warning does not enhance the value of the product in the eyes of the consumers of that product, the manufacturer is unable to appropriate the value of the benefit to consumers.

In general, appropriability can be reduced by imitation, by the inability to engage in perfect price discrimination, by the absence of business models that enable everything to be priced, and by competitive pressures to the extent that they prevent prices from rising. At the extreme end of the competition spectrum, a firm in a monopoly position gains the maximum profit, given the nature of market demand, appropriating a far greater share of the value it creates than do firms operating at the other competitive extreme, ► **perfect competition**, in which product prices are forced down to the marginal costs of producing one more unit. Nevertheless, even monopolists are unable to extract all the consumer surplus, unless they are able to charge each consumer their exact willingness to pay and there are no positive externalities from the sale and use of the product.

Appropriability is enhanced by mechanisms that dampen competitive and imitative pressures. The availability of intellectual property protections, such as patents and copyrights, can enhance the appropriability of benefits associated with innovation and the production of creative works. Loyalty programmes and other systems that reduce the customer propensity to switch to a rival each time a small difference in price occurs can also boost appropriability. Such methods are sometimes referred to in the strategic management literature as “► **isolating mechanisms**” (Rumelt 1984).

In some cases, where learning curves are steep, appropriability may be improved by rapid investment that allows the innovator to develop a strong cost advantage over follow-on rivals.

Although the pursuit of better appropriability of the firm's added value can be thought of broadly as the core strategic mission of any for-profit enterprise, its usage in the economics and business literatures is generally reserved for discussions of invention and innovation. In this context, appropriability is therefore one of the

factors determining the extent of ► [entrepreneurial rents](#).

Research on appropriability falls into two main categories. One is the relationship of appropriability to the incentive to innovate. The other category takes the presence of an innovation as its starting point and uses appropriability as one factor in the formulation of a strategy for profiting from the innovation.

## Appropriability and Inventive Activity

Recognition of the potential problem that weak appropriability poses for innovative activity dates back to at least ► [Schumpeter, Joseph \(1883–1959\) \(1942\)](#). Schumpeter pointed out that, in the idealized economic setting of perfect competition, where rivalry forces prices down to the marginal cost of production, firms have relatively little incentive to innovate. In other words, it is the presence of some kind of market power, whatever its source, that allows firms to appropriate and reinvest some of the value created by investing in previous product and process inventions.

► [Arrow, Kenneth \(Born 1921\)](#) pointed out that, in cases where a company's invention competes against its existing product, the innovating monopolist faces the disincentive of cannibalizing its own business (Arrow 1962: 622). Gilbert and Newbery (1982) looked at this a different way and showed that, in theory, an incumbent monopolist would have an incentive to at least patent such innovations in order to pre-empt entry by new competitors. The monopolist would not necessarily manufacture the product, but putting the new product on the market would be a surer means of pre-emption.

A large amount of theoretical research has modelled many aspects of the innovation incentive issue by adding additional variables, such as technological uncertainty. Prominent examples from this literature include Kamien and Schwartz (1970), Loury (1979), Dasgupta and Stiglitz (1980), Nelson and Winter (1982) and Reinganum (1983).

Empirical work in this area has tended to undermine the Schumpeterian hypothesis about

the positive role of monopolies in innovation. Unfavourable findings were reported in Scherer (1965) and Geroski (1990). Levin et al. (1985) found that the strength of appropriability in an industry was a greater predictor of innovative activity (measured by the R&D-to-sales ratio or the rate of new product or process introductions) than concentration (i.e., the market power of incumbents).

## Appropriability and Strategy Formation

In the strategic management literature, the concept of appropriability is the focus of the ► [profiting from innovation](#) framework, initially proposed by Teece (1986). Until this framework was put forward, the strategic approach to appropriability was based principally on industrial organization economics, which “fixated on market structure as a proxy for market power, as if that was all that mattered” (Teece 2006: 1132). The profiting from innovation framework considers a far broader range of factors, including the dynamics of market entry timing, the ► [complementary asset](#) structure required for commercialization, the contractual mechanisms employed to access assets, the asset position of other value chain participants and intellectual property protection. As Winter (2006) pointed out, Teece provided a conceptual approach to reasoning through the practical complexities of moving an innovation from the point of inspiration to the market, whereas earlier analyses of appropriability had oversimplified the concept of an innovation to that of a readily commercializable product or process.

In the profiting from innovation framework, an understanding of the relevant appropriability regime should inform the innovator's strategy for positioning itself to prevent other firms from capturing the value generated by its innovation. An appropriability regime is narrower than the full definition of appropriability given above, and encompasses only legal mechanisms, such as patents, and the nature of the innovation, such as its complexity or tacitness. The appropriability regime does not include strategic factors such as raising customer switching costs.

Appropriability regimes, which differ across technological disciplines, industries and countries, are characterized by their strength, namely how much protection they afford to the innovation. An appropriability regime is “weak” when innovations are difficult to protect, for example, when they can be easily codified and/or legal protection of intellectual property is ineffective. At the other end of the spectrum, appropriability is “strong” when the key knowledge about an innovation is tacit and/or it is well protected legally.

The profiting from innovation framework combines the concept of appropriability with that of complementary assets. To capture the largest share of the created value, the innovator must define the boundaries of its activity to include (by ownership or alliance) any complementary assets that are, or will become, more valuable or scarce if the innovation is successful in the market. An innovator’s asset architecture becomes more important as the appropriability regime is weaker.

As a matter of strategy, the appropriability regime applicable to a given innovation can be influenced by the innovator. For example, a firm with a strong position in downstream complementary assets might decide it is in its interest to weaken the upstream appropriability regime, as in the case of IBM making its server operating system available as a non-proprietary product to gain advantage in the sale of related hardware, applications and services (Pisano and Teece 2007). In other cases, firms can seek to strengthen the appropriability regime that they face, for example, by working to strengthen intellectual property rights in important developing country markets.

In practice, however, weak appropriability is the most common case, and the profiting from innovation framework points to acquiring or developing key complements to the innovation that are less subject to imitation as a means of capturing value. Thus, as rock bands found themselves losing album sales with the spread of illegal Internet copying of their work, they have compensated to some degree by drawing a larger share of their income from live performances.

There is at least one case in which a possible response to weak appropriability is not to strengthen it but rather to collectivize it. Richard Nelson (1959) pointed out that basic research, which is undertaken to reveal general scientific principles with no specific application in view, is typically characterized by weak appropriability. In fact, a truly general result, such as a “natural law”, is not patentable at all. Nelson went on to point out that, in cases where there is a need to conduct basic research and no support for it to be done by non-profit or university researchers, then an industrial research alliance can reduce the cost by sharing it amongst all the firms involved.

Oxley verified the relevance of appropriability for the formation of alliances by building a model that incorporated contracting concepts from ► [transaction cost economics](#). Looking at a range of inter-firm alliances in creating and exploiting knowledge, she found that, when appropriability hazards are severe, alliances are most likely to be formal joint ventures rather than looser contractual arrangements “because of difficulties in specifying contracts for technology or in monitoring contracting partners’ activities” (Oxley 1997: 406).

## How Do Firms Pursue Appropriability?

A common belief is that a patent provides protection against the theft of intellectual property and the encroachment of rivals. In practice, however, patents are generally no guarantee of strong appropriability. As Kenneth Arrow observed, “no amount of legal protection can make a thoroughly appropriable commodity of something so intangible as information” (Arrow 1962: 615).

For practical purposes, a patent may not be of value against rivals until it has been tested in a court case over a challenge of validity or a claim of infringement, which involves a major financial commitment. And in many countries, law enforcement for intellectual property is weak or non-existent.

Moreover, many patents can be “invented around” at modest costs (Mansfield et al. 1981; Mansfield 1985). Mansfield et al. (1981) found



that about 60% of the patented innovations in their sample were imitated within 4 years. In a later study, Mansfield (1985) found that information concerning product and process development decisions was generally in the hands of at least several rivals within 12–18 months, on average, after that decision was made. Process development decisions tend to leak out more than product development decisions in almost all industries, but the difference on average was found to be less than 6 months.

In some cases, trade secrets can provide strong appropriability. ► [trade secret](#) protection works when a firm can put its product before the public and still keep the underlying technology hidden. Many industrial processes, including semiconductor fabrication, are of this kind.

Two major surveys asked firms what mechanisms they actually use to protect their know-how. Levin and colleagues (1987) surveyed 650 R&D executives in 130 industries about the appropriability conditions they considered typical of their industry. The mechanisms about which they were asked were patents, secrecy, lead time, learning and complementary sales activity.

Across all industries, patents were rated the least effective means of protecting process innovation, with learning advantages and secrecy being rated most effective. The only lines of business in which process patents were seen as highly effective were cement and primary copper.

For product innovations, lead time, progress in learning and sales activity were rated more highly than patents for the appropriability of value. The lines of business in which product patents were seen as highly effective were various chemical products and relatively simple mechanical products, such as air compressors.

In a small number of industries, including lines of business in food products and metalworking, none of the mechanisms was rated highly effective for ensuring appropriability.

In a follow-on study, Cohen et al. (2000) received responses from 1478 US R&D labs owned by manufacturing firms. Their findings confirmed that patents were almost never the most effective means of protecting an innovation.

The biggest change from the earlier study is that secrecy had come to be seen as much more important for ensuring appropriability, especially for product innovations.

Cohen, Nelson and Walsh nevertheless saw an increase in the use of patents by large firms. These were sometimes obtained mainly to block rivals from developing a related invention to the one in which the patenting firm was most interested. This strategy was characteristic of industries with stand-alone innovations, like chemicals, as opposed to complex system products. In systems industries, like telecommunications equipment, patenting was often pursued as a negotiating tool for licensing agreements and lawsuit prevention.

There is some evidence that these results apply outside the United States as well. Harabi (1995) applied the Levin and colleagues (1987) survey approach in Switzerland and found the overall results to be “very similar” (Harabi 1995: 987).

## See Also

- [Arrow, Kenneth J. \(Born 1921\)](#)
- [Complementary Asset](#)
- [Entrepreneurial Rents](#)
- [First-Mover Advantage](#)
- [Isolating Mechanisms](#)
- [Patents](#)
- [Perfect Competition](#)
- [Profiting From Innovation](#)
- [Schumpeter, Joseph \(1883–1950\)](#)
- [Trade Secret](#)
- [Transaction Cost Economics](#)

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## Arbitrage and Its Limits

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### Abstract

Unlike standard asset pricing theory which assumes frictionless arbitrage, the ‘limits of arbitrage’ theory of financial markets studies the asset pricing, liquidity and welfare implications of the constraints faced by real-life arbitrageurs such as hedge funds and other financial intermediaries. Among other results, it can explain amplification and cross-market contagion episodes, sudden liquidity dry-ups and liquidity linkages across markets, and offers a useful framework for public policy analysis.

**Definition** The ‘limits of arbitrage’ theory of financial markets studies the asset pricing, liquidity and welfare implications of the constraints faced by real-life arbitrageurs such as hedge funds and other financial institutions.

Arbitrage, the simultaneous purchase and sale of assets or portfolios with identical payoffs to exploit a price difference between them, is central to financial economics.

Standard theories assume frictionless arbitrage, implying the ‘absence of arbitrage opportunities in equilibrium’, the finance incarnation of the ► **law of one price**. This premise implies the existence of state prices and an equivalent martingale measure. It underlies much of contingent-claims pricing, such as the binomial and Black–Scholes models for pricing options and other financial derivatives (see, e.g., Duffie (2001), for a textbook treatment).

However, the theory is at odds with the observation that assets with near-identical payoffs (e.g., ‘Siamese-twin stocks’ or ‘on- and off-the-run’ government bonds) sometimes trade at considerably different prices. Indeed, it predicts that arbitrageurs would exploit these profit opportunities, eliminating them in the process. Nor are standard theories easily

reconciled with evidence of return predictability, such as short-run momentum or long-run reversal.

Such challenges have prompted the emergence of ‘limits of arbitrage’ theories (see Gromb and Vayanos (2010) for a survey). These posit that real-world arbitrageurs such as financial institutions have limited access to funds, due to information or agency problems vis-à-vis their investors. Financial constraints, when binding, inhibit arbitrage, allowing profit opportunities to survive in equilibrium. This approach has far-reaching implications for asset pricing, liquidity and welfare.

### Asset Pricing

To illustrate, suppose that some investors suddenly have to sell large amounts of a given asset. This ‘supply shock’ can possibly cause the asset’s price to drop, offering arbitrageurs a profit opportunity. Unconstrained arbitrageurs would buy the asset, raising any capital needed to do so. Accordingly, even large shocks would have a limited price impact, and arbitrageurs would stabilize prices. If instead arbitrageurs cannot raise funds easily, they may lack the capital necessary to absorb the shock, which can therefore have a substantial and lasting price impact.

In addition, limited arbitrage can amplify a supply shock (e.g., as during financial crises) so its price impact is larger than if there were no arbitrage at all (Shleifer and Vishny 1997). Assume that the arbitrageurs hold large positions in an asset. A supply shock causing the asset’s price to drop implies a capital loss for them. Arbitrageurs may not only fail to absorb the shock, but also have to sell the asset because as their capital shrinks, their financial constraints tighten. This further depresses the asset price. Hence, arbitrageurs can have a destabilizing effect on asset prices.

Limits to arbitrage can further rationalize contagion across markets (Kyle and Xiong 2001). Following a supply shock for one asset, arbitrageurs’ capital may be depleted, forcing them to sell other assets, transmitting the shock from one market to the others.

More generally, this approach links the evolution of arbitrageurs’ constraints to the time-series

of asset prices and the differing capital amounts required by different trades to the cross-section of asset prices. For instance, it implies that deviations from the law of one price should be more pronounced after arbitrageurs have experienced substantial capital losses, and for assets for which taking a position consumes more capital (e.g., more volatile assets).

### Liquidity

‘Limits of arbitrage’ theories offer a novel perspective on asset market liquidity, that is, the ease with which supply of an asset meets demand. Inverse measures of liquidity include bid-ask spreads or the price impact of a trade. If supply failed to meet demand – for instance because they materialize at different times – potential sellers and buyers would be willing to trade at different prices, presenting arbitrageurs with an inter-temporal profit opportunity. Arbitrageurs can thus be viewed as financial intermediaries (e.g., ‘market makers’) providing liquidity to other market participants.

Under frictionless arbitrage, there are no impediments to arbitrageurs’ liquidity provision, which is therefore perfect. Instead, financial constraints hinder liquidity provision, resulting in imperfect market liquidity (Gromb and Vayanos 2002). As for profit opportunities, this approach has the potential to explain sudden liquidity dry-ups created, liquidity linkages across markets, the covariance of market liquidity and intermediary capital, as well as liquidity differences across markets.

### Welfare

In standard theory, financial market equilibrium is socially efficient; therefore, public intervention is at best redistributive and at worst inefficient. This result, a version of the ‘fundamental welfare theorems’, captures the idea that in a free market economy, prices adjust so that profit-maximizing agents end up making socially efficient choices.

The ‘limits of arbitrage’ approach offers a more fruitful framework for analysing public policy. Indeed, under limited arbitrage, the welfare

theorems do not hold and market equilibrium may be socially inefficient, or ‘constrained inefficient’ (Gromb and Vayanos 2002). The reason is that the financial health of arbitrageurs affects the functioning of financial markets but is itself affected by arbitrageurs’ investment decisions. Moreover each arbitrageur’s privately optimal investment decisions are socially suboptimal because, being a price-taker, he fails to internalize a chain of externalities operating through prices (‘pecuniary externalities’): arbitrageurs’ decisions affects asset prices, which affect other arbitrageurs’ financial constraints, affecting their investment decisions.

Since prices do not induce agents to make socially efficient choices, regulation incentivising or forcing arbitrageurs to take less risk could be desirable. Optimal financial market regulation under limits to arbitrage is a fascinating but nascent research area.

## See Also

- ▶ [Banking Industry](#)
- ▶ [Capital Asset Pricing Model \(CAPM\)](#)
- ▶ [Externality](#)
- ▶ [Law of One Price](#)
- ▶ [Market Price](#)
- ▶ [Perfect Competition](#)
- ▶ [Price Taking](#)
- ▶ [Principal Agent](#)
- ▶ [Regulation/Deregulation](#)
- ▶ [Risk and Uncertainty](#)
- ▶ [Risk-Taking](#)

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## Architectural Competences

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### Abstract

The construct of architectural competence emerged in the early 1990s in works focusing on technological change (in this article we use the term competence and capabilities interchangeably). Architectural competences have had a profound impact on our understanding of the relationship between organizations and innovation and, more precisely, on the causes of subtle failures that might occur in incumbent firms. These works have also contributed to the emergence and/or development of a number of constructs and frames of strategy and innovation, including integrative capabilities, disruptive innovation and modular architectures. We shall touch on these issues and conclude with some critical remarks.

**Definition** An architectural competence is a competence aiming at combining and integrating knowledge, assets and competences of a specialized nature. Such specialized nature may refer to disciplinary areas and/or to functional areas that characterize the activity system of an organization and are created, nurtured and used by the organization in order to gain and sustain competitive advantage.

## Origins and Definition

Classic works in the tradition of the economics of technical change (e.g., Schumpeter 1942; Rosenberg 1982) and its prescriptive implications for managers and engineers (e.g., Abernathy and Utterback 1978; Utterback 1994) initially classified innovation according to the subject it touches on – product versus process innovation – and the degree of innovativeness – incremental versus radical innovation. However, despite some

significant insights, this literature is agnostic about the fundamental relationship between organizational competences and innovation. A number of studies carried out in the 1980s and 1990s targets this crucial strategic issue and unveils the ultimate cause of the failure of incumbent organizations faced with discontinuous change (e.g., Tushman and Romanelli 1985; Tushman and Anderson 1986; Anderson and Tushman 1990). According to these works, technological discontinuities can be competence-enhancing or competence-destroying and can therefore impact on the ability of incumbents to survive technological shocks within industries.

Interestingly enough, these works focused primarily on technological discontinuities – that is, radical innovations – showing how entrants have an advantage over incumbents since the former are not ‘burdened’ with obsolete competences. Still, these works failed to explain more subtle failures like the one described in the by-now classic cases of the mini fan and the photolithography industry. As noted by Henderson and Clark (1990), moving from the product technology of a room air fan to air-conditioning represents a neat discontinuity – that is, a radical innovation. However, changing the characteristics of a room air fan (for instance, its motor or blades) can also represent a product innovation – although incremental in nature. The latter change would probably be competence-enhancing, while the former could be either enhancing or destroying. Scholars and practitioners, however, would be less worried about a shift from a room air fan to a mini fan. Instead, as the authors clarify, such a change could be competence-destroying. In fact, although the product components remain the same (for example, motor, blades, control system) the way the components are combined varies. Such changes do not simply alter the product but the relationship between the product and the organization itself, given that ‘organizations are boundedly rational and, hence, that their knowledge and information-processing structure come to mirror the internal structure of the product they are designing’ (Henderson

and Clark 1990: 27). Therefore, ‘the essence of architectural innovation is that it both enhances and destroys competence, often in subtle ways’ (Henderson and Clark 1990: 28). And, for this reason, it may cause the failure of incumbents. Overall, the creators of the construct conclude: ‘The essence of an architectural innovation is the reconfiguration of an established system to link together existing components in a new way’ (Henderson and Clark 1990: 12).

### Nature and Impact

Are there specific competences behind architectural innovations? The case of the photolithography industry has shown that architectural knowledge is embedded in communication channels, information filters and problem-solving strategies of teams involved in the development of new products (Henderson and Clark 1990). The inability to capture the essence of an architectural innovation lies in the organizational design, the communication systems and the iterative nature of problem-solving, which is primarily component-based and takes for granted the current architecture of the product. In fact: “‘Component competence’ or the local abilities and knowledge . . . are fundamental to day-to-day problem-solving, and “architectural competence” or the ability to *use* these component competences – to integrate them effectively and to develop fresh component competences as they are required’ (Henderson and Cockburn 1994: 65). In an initial empirical work specifically addressing the impact of architectural competences on innovation productivity, Henderson and Cockburn (1994) studied four architectural competences: the fact that publication plays a key role in promotion; the fact that resource allocation decisions are distributed and not centralized under a single individual; the fact that the firm sustains a rich flow of information across boundaries; and the fact that research worldwide is managed as a whole. Overall, the authors find a positive link with research productivity, particularly as regards the first two variables.



## Conceptual Contribution and Derivations

Since their introduction, architectural competences have contributed to at least three conceptual developments in the field of strategy and innovation: the construct of integrative capabilities, the notion of modularity and the frame of disruptive innovation.

Architectural knowledge refers to specific organizational characteristics that structure problem-solving and shape the development of new competences, such as control systems and the 'culture', or dominant values of the organization (see also Leonard-Barton 1992; Iansiti and Clark 1994). Consequently, over the years, the term architectural competences became synonymous with integrative competences (e.g., Galunic and Eisenhardt 2001). Many works have measured how architectural and integrative competences impact the innovation performance of firms, finding positive results regarding the efficiency and effectiveness of new products (see Verona 1999, for a review).

Architectural innovation and competences have also contributed to the theory of modularity. Within organizational design, modularity implies 'subsystems that can be designed independently' (Baldwin and Clark 2000: 84). In turn, modularity boosts the rate of innovation of subsystems by allowing them to adapt freely and with only limited constraints imposed by other subsystems (Schilling 2000; Galunic and Eisenhardt 2001). Moreover, vis-à-vis architectural innovation, it generates recombinant opportunities across the entire system (Henderson and Clark 1990). Therefore, modularity enhances innovation and adaptation at both the subsystem and system levels (Galunic and Eisenhardt 2001). Addressing an inter-organizational view of innovation and modularity, Brusoni et al. (2001) also built their system integration model of innovation on the architectural coordination of product components.

The construct of architectural innovation also helped identify a further cause of incumbent failure, commonly termed disruptive innovation (Christensen and Bower 1996; Christensen 1997). In fact, a series of architectural innovations in the disk drive industry has highlighted the fact that

leading firms tend to fail not from any lack of architectural competences but because of the resource allocation mechanisms that serve the needs of mainstream markets mainly interested in the sustained technological trajectory. Consequently, the ability of new entrants to listen to the needs of niche customers in the disk drive industry who are interested not in sustained technology but in architectural innovations gives these new ventures the opportunity to develop the industry. Once developed, this innovation has shown its affirmation in the entire disk drive market, hence disrupting its sustaining and traditional logic. Although, over the years, the process of disruption has been studied in different contexts other than the disk drive industry and has often been related to a large reduction in price (Christensen 2006), its original rationale seems to remain strictly linked to the notion of architectural innovation.

## Conclusions

Architectural competences have clearly contributed to our understanding of innovation and resources, two crucial constructs in the strategy of modern organization. They have also contributed to the development of specific frames, such as those of modularity and disruptive innovation, which represent important pillars of organization design and innovation management. The success of the term, however, has been obtained at a price. Two critiques are usually associated with the concept.

Although the very authors that coined the term architectural competences tend to associate it with the more general notion of integrative competences (Henderson and Cockburn 1994), the term undoubtedly presents a semantic dimension of design which suggests a peculiar type of integration – that is, the one related to architectural innovation. Therefore, a critique of the term is a more general critique of the notion of architectural innovation and its frequency. While fascinating and conceptually distinguished from incremental and radical innovation (Smith and Tushman 2005), it is empirically not easy to distinguish between radical, architectural, incremental and modular innovations. Probably for this reason,

one of the most frequent associations with architectural innovation is miniaturization – as in the case of the mini fan and the walkman, miniaturized respectively, from the room air fan and hi-fi systems. Interestingly enough, such cases are probably not as frequent as the more classic cases of incremental innovation and radical innovation. As such, they pose a challenge in the measurement of their antecedents (i.e., architectural competences) and their impact.

A second critique may refer to the behavioural dimension of architectural competences. Although, until now, studies seem to have paid particular attention to the structural dimension of the competence, it is clear that the cognitive and behavioural dimension may also play a crucial role. Future research could therefore try to target these opportunities to help further differentiate and consolidate the concept of architectural competence and innovation.

## See Also

- ▶ [Disruptive Technology](#)
- ▶ [Technological Change](#)

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## Architectural Innovation

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### Abstract

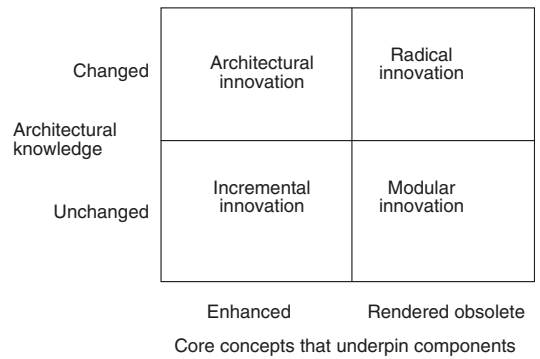
All systems – whether products or organizations – are made up of components and the linkages between them. Therefore, innovation often entails making changes in the components and/or linkages. In an architectural innovation, known components are reconfigured into new patterns (architectures), achieving desired levels of performance. Knowledge of linkages changes but the core

concepts that underpin the components do not. Not only can architectural innovation deliver surprisingly higher levels of system performance, it often has a stealth factor that new entrants can use to erode the competitive advantages of incumbents. Incumbents have to be particularly careful about the stealth/disruptive nature of architectural innovations.

**Definition** An architectural innovation is one in which the linkages between the core components of a system (a product or organization) change but the core concepts that underpin the components do not. The concept of architectural innovation helps us understand why incumbents fail at seemingly routine innovations, and a lot more.

Since at least Schumpeter (1934), scholars of innovation have been fascinated by why established incumbents lose their competitive advantages to new entrants in the face of certain innovations, but are able to reinforce their competitive advantages in the face of other innovations. They have been baffled by why Schumpeter’s creative destruction does not come with every innovation. Some of the researchers who first explored this question argued that incumbents are likely to lose their competitive advantages in the face of radical or so-called competence-destroying innovations, but reinforce their dominance with incremental or competence-enhancing innovations (Tushman and Anderson 1986). Thus, Henderson and Clark were puzzled by why established incumbents sometimes failed, rather than thrived, at seemingly incremental innovations. For example, Xerox stumbled for years before finally developing a good small plain-paper copier, despite being the pioneer of the core copier technology of xerography.

In their seminal paper, Henderson and Clark (1990) answered the question that had puzzled them, and a lot more. They argued that since a product (system) is made up of components connected by linkages, designing them requires both knowledge of the components and knowledge of linkages between the components. (They called knowledge of linkages between components *architectural knowledge*.) Thus, an



**Architectural Innovation, Fig. 1** Different types of innovation

innovation involves changes in either component knowledge or architectural knowledge, or both (Fig. 1). An *architectural innovation* changes the way in which the components of a product or system are linked but leaves the core concepts that underpin the components unchanged. According to Henderson and Clark (1990: 12): ‘The essence of an architectural innovation is the reconfiguration of an established system to link together existing components in a new way.’ However, this does not mean that all the components are unscathed. ‘Architectural innovation is often triggered by a change in a component – perhaps size or some other subsidiary parameter of its design – that creates new interactions and new linkages with other components in the established product’ (1990: 12). Subsequently, Baldwin and Clark (2006) argued that an ‘architectural innovation involves rearranging known parts (components) into new patterns (architectures) to achieve higher levels of system performance on one or more dimensions’.

In an incremental innovation, the architectural knowledge and the core concepts that underpin components do not change (Fig. 1). Any component or architectural knowledge that firms have remains useful and incumbents can use it to reinforce their competitive advantages. Contrast this with an architectural innovation in which architectural knowledge is changed, unlike the core concepts that underpin components. Figure 1 shows two other kinds of innovation: radical and modular. In a radical innovation both the core

concepts that underpin components and the linkages between them are changed. In a modular innovation, knowledge of the core concepts that underpin components changes, whereas architectural knowledge does not.

### Failure of Incumbents in the Face of Architectural Innovation

Having defined an architectural innovation, the question becomes: why do incumbents sometimes fail at architectural innovations? This is an important question in strategic management, where explaining performance differences is fundamental. To understand the performance of incumbents in the face of an architectural innovation, it is important to first understand what these incumbents bring to the table when innovating. Before an architectural innovation, established firms may have built competences/capabilities in the established design/system that must be reconfigured during architectural innovation (Henderson and Clark 1990). They may also have developed cognitive frames that are engrained in the established design/system – beliefs about which component must interact with which one and how, for optimal system performance (Tripsas and Gavetti 2000). They may have developed routines, processes and values that are rooted in the established design. Finally, they may have built important relationships or entered binding contracts with customers, complementors or suppliers that are also closely linked to the established design.

In the face of an architectural change, one or more of three things can happen. First, given that its cognitive frame is wired into the established design, an incumbent firm may not recognize the subtle changes that are characteristic of architectural innovations. It may not understand which architectural knowledge remains useful and which is not. This may mislead the incumbent into pursuing the architectural innovation as if it were an incremental one. This is a mistake that incumbents often make, as Henderson and Clark (1990) found in photolithography, and Afuah (2000) found in Reduced Instruction Set Computer

(RISC) microprocessors. Second, the established firm may not have the right competences to undertake the reconfiguration that is required of an architectural innovation. Apple's iPod, iPhone and iPad were all architectural innovations; and many of Apple's competitors had difficulty replicating its sleek designs. Third, an established firm may be prevented by prior commitments from acquiring the knowhow and other resources needed to undertake the innovation. For example, contracts with distributors and suppliers may significantly delay an established firm's acquisition of the necessary know-how to competitively exploit the architectural innovation. Despite these handicaps, some incumbents still do well in the face of architectural innovation. Why?

### Why Some Incumbents Succeed

Many of the same ► [complementary asset](#) such as distribution channels, shelf space, brand name reputation and relationships with customers that are used to profit from an established design/product are often also needed to profit from an architectural innovation. If such assets are scarce and difficult to replicate, an incumbent who has them can use them to make money from an architectural innovation (Teece 1986). An incumbent who creates a start-up unit to focus on the architectural innovation may also be able to profit from it since such a unit will not have the handicaps that a unit within the incumbent organization has. Finally, if the firm has so-called ► [dynamic capabilities](#), it may be able to profitably undertake the innovation.

### Architectural Innovation and Strategy Theories

To keep their arguments tractable, Henderson and Clark (1990) limited their examples to products. But their logic can and has been extended to other systems. We look at some extensions in the context of three strategy theoretical perspectives: the ► [resource based view](#) of the firm, the product market position and dynamic capabilities.

### Resource-Based View (RBV) of the Firm

In RBV, a sustainable competitive advantage comes from valuable, scarce difficult-to-imitate-or-substitute resources (Peteraf 1993). From an architectural innovation perspective, resources such as R&D know-how, design expertise, manufacturing resources, advertising know-how and so on are the components, while the ability to integrate these resources to offer a profitable product are the linkages between the components. Henderson and Cockburn (1994) called the former component competences and the latter ► [architectural competences](#). Architectural competences are more intangible and more associated with causal ambiguity than component competences. Thus, one can expect architectural competences to be more difficult to imitate and therefore a better source of sustainable competitive advantage than component ones.

### Product Market Position

In the product market position view of strategy, competitive advantage comes from choosing the right position (low-cost or differentiated product) within an attractive industry, and performing the right system of activities (Porter 1996). Sustainability of such an advantage comes from having a *system* of activities that is difficult to imitate, even if some of the individual activities can be imitated (Porter 1996; Rivkin 2000). From an architectural innovation point of view, each of these activities is a component, while the interactions among them are the architectural linkages. Imitating a firm means having to reconfigure one's own activities, recognizing the subtleties of architectural innovation, and dealing with them. This can be difficult, and may explain why some strategies are difficult to imitate.

### Dynamic Capabilities

According to Teece et al. (1997: 512), dynamic capabilities are 'the ability to integrate, build, and reconfigure internal and external competencies to address rapidly-changing environments'. Incumbents who are able to defend their competitive advantages in the face of environmental change are those with dynamic capabilities – resource/capabilities that can be reconfigured to obtain the

types of capabilities that are needed to respond to the change (Helfat 1997). From an architectural innovation point of view, the 'internal and external competences' that Teece and colleagues talked about are components in a system in which the interactions between the components that result from integration are the architectural competences. In their study of dynamic capabilities, Galunic and Eisenhardt (2001) see architectural innovation as the reconfiguration of the resources of a firm's different divisions during innovation.

### Future Research Directions

The concept of architectural innovation helps us to answer the question of why incumbents might fail at what appear to be incremental innovations that they are expected to excel at, *and a lot more*. As hinted above in the discussion of different strategy theoretical perspectives, architectural innovation can offer explanations for why firms gain sustainable competitive advantages that are as convincing as those offered by prevailing strategy theoretical perspectives. Future research could flesh out some of the associated propositions.

Finally, most architectural innovation research has focused on incumbents, especially on why they fail. Future research could explore what new entrants can do to be even more successful at architectural innovation. In the process, the research could look at public policy implications, especially for emerging economies. Could architectural innovation help developing countries develop products that better meet their needs, thereby helping them to better deal with poverty?

### See Also

- [Appropriability](#)
- [Architectural Competences](#)
- [Complementary Asset](#)
- [Disruptive Technology](#)
- [Dynamic Capabilities](#)
- [Resource-Based View](#)
- [Systemic Innovation](#)



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## Arrow, Kenneth J. (Born 1921)

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### Abstract

Apart from Kenneth Arrow’s vast contributions to economic science, recognized in the award of a Nobel Prize in 1972 and a Medal of Science in 2004, Arrow was also a major

pioneer of the emerging discipline of ► [operations research](#), especially in his work during the years 1949–1951 on sequential ► [decision-making](#) and its application to inventory theory.

Born and brought up in New York City, Arrow pursued graduate studies in mathematics and then economics at Columbia University. These were interrupted from 1942 to 1946 by service as a weather officer in the US Air Force. One by-product was Arrow (1949), his first published paper. It used calculus of variations techniques to find minimum time flight paths through variable winds around a spherical earth. This contrasted markedly with an earlier solution that the notable mathematicians Zermelo and Levi-Civita, amongst others, had derived only for the case of a flat earth.

Once his academic career had resumed in 1946, Arrow helped advance the emerging discipline of operations research. First came Arrow et al. (1949) that built on earlier work by Wald (1947) and others to analyse ‘sequential decision problems’. Arrow (2002) records some of the relevant history. A notable feature is the use of an infinite horizon right from the start. The 1949 paper, along with Arrow et al. (1951) on finding optimal inventory policies in stochastic environments, represent early examples that helped to inspire the work on a general procedure that Bellman (1952, 1957) so aptly described as dynamic programming. Indeed, equations (4.11) and (4.12) on page 263 of Arrow et al. (1951) amount to the relevant version of the ‘Bellman equation’ for infinite horizon discounted dynamic programming. The same paper also acknowledges an even earlier precursor, with some similar ideas, in Massé’s (1946) two-volume study of optimal ‘reserves’. Arrow et al. (1958) showed Arrow’s continuing interest in optimal inventory policy. A notable challenge was to establish broad sufficient conditions for two-bin or ‘(S, s)’ inventory policies to be optimal; Scarf (1960) finally achieved this in a volume co-edited by Arrow that included several other papers on inventory policy.

Meanwhile, Arrow had been developing his career as one of the outstanding economists of

the twentieth century. The year 1951 also saw his Ph.D. thesis on social choice published in monograph form as Arrow (1951a), and the paper Arrow (1951b) on the Pareto efficiency of perfectly competitive markets. Both these can be seen as early contributions to the literature on multi-criteria decision-making, later discussed at some length in Arrow and Raynaud (1986). Another article (Arrow 1951c) summarized the state of the art in modelling decision-making under uncertainty, a theme later developed in his books of essays on the theory of risk bearing (Arrow 1965, 1971). Soon after Arrow and Debreu (1954) greatly advanced what was known about sufficient conditions for the existence of a general competitive market equilibrium. By 1956, having been elected President of the Econometric Society, he devoted his presidential address (Arrow 1957) to showing how ideas and techniques from operations research could be applied to the conduct of economic policy.

From 1960 on, Arrow's work was increasingly devoted to economics rather than operations research. Apart from numerous research articles, later books include Arrow and Kurz (1970) on some economic applications of optimal control techniques, Arrow and Hahn (1971) on general economic equilibrium, Arrow (1974) on organizational limits, and Arrow and Hurwicz (1977) on resource allocation processes, along with six volumes of collected papers (Arrow 1983–1985). Apart from social choice, these papers include pioneering contributions to what have since become major disciplines of economics, such as growth theory and health economics. Especially notable are his early contributions to the economics of information, including the problems involved in ensuring incentives for its appropriate revelation and optimal use by individuals within an organization. Other significant contributions concerned technical progress and learning by doing. For this corpus of work he was awarded the Economics Nobel Prize in 1972, only 4 years after its inception, and at what remains the record young age of 51. Earlier, in 1957, he received the John Bates Clark Medal of the American Economic Association, then awarded biennially to the best American economist under the age of 40.

Arrow served not only as president of the Econometric Society in 1956, the American Economic Association in 1972, and the International Economic Association in 1983–1986; more relevantly, perhaps, to operations research, he was also president of the Institute of Management Sciences in 1963, publishing his presidential address as Arrow (1964). He was too the founding president of the International Society for Inventory Research in 1983–1988. In 1986 he won the John von Neumann Theory Prize of INFORMS (the Institute for Operations Research and the Management Sciences), and in 2004 he was awarded a National Medal of Science.

In 1953, after being an Associate Professor of Economics and Statistics at Stanford, he was promoted to a full professorship and had 'Operations Research' added to his title. Along with Gerald Lieberman, during the late 1950s and into the 1960s, Arrow helped provide the impetus for Stanford to set up a Ph.D. programme in Operations Research, and in 1967 a Department within the Engineering School; this was later absorbed into the Department of Management Science and Engineering. After his 1968–1979 interlude at Harvard, he returned to Stanford as the Joan Kenney Professor of Economics and Professor of Operations Research, progressing to emeritus status in 1991. Stanford's School of Engineering recognized him as one of its 2013 Engineering Heroes, stating in particular that, based on Arrow (1962), he was one of the first economists to note the existence of a learning curve.

Overall, Arrow's accomplishments in operations research mark him out as a giant in the field, yet represent only a small portion of his overall scientific contribution.

### See Also

- ▶ [Decision-Making](#)
- ▶ [Dynamic Capabilities](#)
- ▶ [Expected Utility](#)
- ▶ [Operations Research](#)
- ▶ [Resource Allocation Theory](#)
- ▶ [Risk and Uncertainty](#)

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## Aspiration Levels and Learning

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### Abstract

Theories of experiential learning assume that an adaptive process replicates success. In this article we outline the importance of studying an interaction between learning and aspiration levels and briefly examine the role of aspirations in ► [risk taking](#) and decision-making contexts, and the issue of historically and socially formed ► [adaptive aspirations](#). By exploring some of the gaps in literature on adaptive aspirations and learning we explicate the importance of adaptive aspirations for organizational behaviour and strategic management.

**Definition** Aspiration levels are defined as goals set by an actor. The aspiration levels are used for interpreting the actor’s actions as successes and failures.

Theories of experiential learning assume that an adaptive process replicates success. Practices and attributes associated with successful experience are repeated or retained more often than are practices and attributes associated with unsuccessful experience. Whether a particular practice or attribute will be replicated depends on whether an outcome associated with that practice or attribute has been interpreted by the learner as a ‘success’ or a ‘failure’. Since a theory of learning is also a theory of coding experience, it is important to understand the mechanisms by which a particular experience has been framed.

A common function for mapping outcomes as successes or failures is an aspiration level (March and Simon 1958). Outcomes that are equal to or greater than an aspiration are defined as successes. Outcomes that are less than an aspiration are defined as failures. Thus, aspirations play an important role in the coding of experience and learning process. This suggests that aspirations may have important implications for organizational behaviour and strategic management research.

### The Importance of Aspiration Levels for Strategic Management

Success stories play a significant role in business discourse (Strang and Macy 2001; Denrell 2003). Thus, an understanding of how a judgement about whether an outcome is a success or failure becomes crucial for theories of learning. Evidence suggests that such judgement is imposed on learning by individual and organizational learners. For instance, in a business context, it has been recognized that successes and failures are often judged in relation to management's original aims for the activities (Bane and Neubauer 1981). Similarly, in an entrepreneurial process, failure is seen as an outcome that has fallen short of entrepreneurial goals, which are themselves idiosyncratic in a particular individual and context (McGrath 1999). Thus, the role of goals or aspirations has important implications for interpreting outcomes as successes and failures. By recognizing the importance of aspirations for strategic management processes, recent work has examined the role that aspirations play in, for instance, organizational change (Labianca et al. 2009) and capability learning (Winter 2000). Extreme cases represent situations in which a learner behaves as being always successful or always failing. These situations are found to lead to superstitious learning behaviour (Levitt and March 1988).

### Aspirations and Risk-Taking

In studies of ► [risk taking](#), an aspiration level defines a zero-point between gains and losses

that affects search and risk-taking (Kahneman and Tversky 1979; March and Shapira 1992; Greve 1998). The significance of the cognitive process by which the zero-point is established has been summarized in the expression 'risk seeking for losses, risk aversion for gains'. Note, however, that Audia and Greve (2006) found evidence that the effect of aspirations on the risk behaviour of a firm depended on firm size. In particular, they show that performance below the aspiration level either has no influence on risk-taking or increases risk-taking in large firms, but reduces risk-taking in small firms.

Further, it has been found that risk biases occur due to a tendency that successes are more likely to be attributed to ability and failures to luck (Levinthal and March 1993). Thus, when outcomes are attributed to luck, there is an overestimation of risk and subsequent risk aversion. Persistent failure, which is related to aspirations that are too high, leads to overestimating the risk, whereas persistent success, which is related to aspirations that are too low, leads to underestimating the risk (Levinthal and March 1993).

### Aspirations and Decision-Making

In studies of decision-making, individuals and organizations have been pictured as ► [satisficing](#), that is, as searching only until they find an alternative that achieves some target (Simon 1955; Levinthal and March 1981; Nelson and Winter 1982). Empirical evidence shows that actors satisfice, rather than optimize. Within satisficing models, the actors' aspiration levels determine when alternatives are acceptable and when they are not (March and Simon 1958). Thus, an aspiration level is one of the most common functions for evaluating whether a practice, alternative or attribute is seen as satisficing. In particular, alternatives that are equal to or greater than an aspiration are defined as acceptable, while alternatives that are less than an aspiration are defined as unacceptable. The construction whether an alternative is acceptable or not is not inherent in the decision situation. This construction is imposed on decision-making by the

actor in two ways – either through some kind of deliberate wilful choice or by some cognitive mechanism. Thus, any decision routine can be seen as a sequence of acceptable and unacceptable alternatives in which an aspiration level distinguishes between these alternatives.

## Historical and Social Aspirations

Even though aspirations levels may remain fixed and exogenously given, it is realistic to assume that aspirations can change over time. For example, one person's success on one day may be another person's failure on another. The phenomenon of hedonic adaptation can be seen as a variation of the same idea. Also, empirical evidence shows that learning models with adjusting aspiration levels explain data better than models with fixed aspiration levels (see, for example, Bereby-Meyer and Erev 1998).

Aspirations can adjust over time in response to performance. This can happen in two ways. First, aspirations can adjust to the experience of the individual or organizational learners (Cyert and March 1963; Levinthal and March 1981). There are speculations about the consequences that stem from the updating of aspiration levels in the literature (see Greve 2002). For example, students of organizations have investigated the formation of aspiration levels in response to experience as a history-dependent process (Lant 1992; Greve 1998, 2002; Mezas et al. 2002). This result has been confirmed in experimental, simulation and empirical data settings. In particular, previous aspiration levels are adjusted in response to performance in a current time period such that: (1) if current performance is higher than the previous aspiration level, there will be an upward adjusting of the aspiration level, and (2) if current performance is lower than the previous aspiration level, there will be a downward adjusting of the aspiration level.

Second, aspirations might adjust to the experience of others (Chapman and Volkmann 1939; Festinger 1942; Cyert and March 1963). In situations when aspiration levels are affected by the performance of an actor's reference group (Cyert and March 1963), actors are conscious of others that are comparable to them and their experiences,

particularly how well they do. Empirical evidence at an individual level suggests that socially formed aspirations are more influential in situations when a learner lacks experience of a particular task (Chapman and Volkmann 1939). It has also been recognized that the status of the learner's reference group plays a role in socially formed aspirations (Festinger 1942). At an organizational level, it has been suggested that an organization tends to learn from its own experience when performance is near aspirations, but learns more from others' experience when performance deviates from aspirations (Baum and Dahlin 2007). Further, Labianca and colleagues (2009) made a distinction between two reference groups that an organization may have – the one of direct competitors and the one of other comparable organizations. The results suggest that organizations performing well when compared with their competitors will not become inertial, but will rather undergo an organizational change by forming their aspirations according to other, comparable organizations (Labianca et al. 2009).

## Adaptive Aspirations and Learning: Limited Evidence

The problem of adaptive aspiration levels has intrigued psychologists and economists alike. However, except to a very limited extent, the effects of aspirations on learning have not been subjected to detailed examination. Partial exceptions are found in studies that have recognized the importance of accounting for endogenously changing aspirations (see, for example, Börgers and Sarin 1997). It has been found that endogenous aspiration levels are disadvantageous in most cases, except when the initial aspiration level is low and constant over time (Börgers and Sarin 1997, 2000).

There are three reasons for limited evidence on the effects of aspirations on learning. First, the subjectivity of success is suppressed in classical animal studies that use unambiguous rewards (e.g., providing food) and punishments (e.g., electric shocks or no food) to produce learning.

Second, the aspiration-level tradition has emphasized relatively global motivational effects



on the formation of aspirations in organizational context. As shown above, an individual or organization forms aspirations as a function of either their own history or of the histories of others in their social reference group. It has been shown that historical and social aspirations may be different, but they produce similar behavioural consequences (Greve 1998).

Third, the aspiration-level tradition emphasized the adaptation of aspirations in highly stylized situations. For example, in ‘win-stay-lose-switch’ (WSLS) repeated games situations, it has been shown that incremental updating of aspirations can produce situations in which aspirations remain close to an equilibrium where players switch actions again and again (Posch 1997; Posch et al. 1999).

## Conclusions

There is little doubt about folk wisdom cautioning against an aspiration that is either too low or too high. Aspirations that are too low are seen as too easily achieved, thus as reducing effort to do better. Aspirations that are too high are seen as too difficult to achieve, thus as producing discouragement and thereby reducing the effort to do better. The key idea in the adaptive process is a greater search for new alternatives. Unlike an aspiration that is too low, a modestly high aspiration may induce a greater search for new alternatives. Aspirations that are too high, on the other hand, lead to abject failure and abandonment of efforts to improve.

In addressing an interaction between learning and aspiration levels, we have briefly reviewed the role of aspirations in risk-taking and decision-making contexts, and made a distinction between historical and social aspirations. Insofar as organizational behaviour is seen as based on routines adapting to experience, there is a need for further examination of ► [adaptive aspirations](#) that represent a basic mechanism affecting the ways in which organizations search for good alternatives. Thus, adaptive aspirations may have profound effects on the effectiveness of the learning process by adjusting aspirations that are either too high or too low to produce modestly high aspirations.

## See Also

- [Adaptive Aspirations](#)
- [Learning and Adaptation](#)
- [Learning and Organizational Failures](#)
- [Organizational Learning](#)
- [Risk-Taking](#)
- [Satisficing](#)

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## Asset Mass Efficiencies

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### Abstract

This entry discusses when firms may expect asset mass efficiencies (economies in the accumulation of resources). Specifically, we describe situations in which the accumulation of a resource benefits from a ‘success-breeds-success’ dynamic that creates an exponentially

growing gap between resource levels of early movers and imitators. Early movers can expect such an advantage where products or services have high evaluation costs, durability, trial costs, network value and cost, impulse characteristics and dependence on complementary products. Where the accumulation of one resource depends on the level of another resource, accumulation economies may also be expected. The mechanisms are illustrated using stylized stocks-flows simulations with the iThink software.

**Definition** Asset mass efficiencies are economies in the accumulation of asset stocks achieved when the increment in a stock (e.g., brand value) resulting from a given investment flow (e.g., advertising) increases with the level of that asset stock.

### Resources as Asset Stocks

Most resources are the cumulative result of a series of investments over a period of time. For example, a firm’s reputation for quality is the result of a consistent set of policies on production and quality control and a consistent investment in communication with customers. Similarly, a business school’s key resource, its reputation for excellence in teaching and research, reflects its past investments in the faculty, the faculty’s investment in research and teaching, ‘word of mouth’ advertising of its alumni base and so on. Likewise, the cost per unit of making a product is related to the cumulative experience in making this product (i.e., the experience curve). More generally, we can state that resources are *stocks*, which are accumulated over time by a stream of investments or *flows*.

It may be useful to provide an intuitive anchor for the view of resources as asset stocks. A resource may be pictured as the amount of water in a bathtub. This is the cumulative result of flows of water into the tub through the tap and out of it through a plughole. Similarly, the level of an asset stock is the cumulative result of investment flows, which build the asset, and outflows that erode the asset over time. In the example of R&D, the amount of water in the tub represents the stock of know-how at a

particular moment. The fact that know-how depreciates or that private knowledge becomes common knowledge is represented by the flow of water leaking through the plughole.

The fact that stocks do not adjust as quickly as flows lies at the heart of the sustainability of ► **competitive advantage**. If competitors have different asset stock levels, the stock–flow dynamics imply that it will take time for them to catch up with the firm that has a higher asset stock level. The time it will take to catch up and the cost of this effort depends on the difference in the asset stock levels and the difference in the net investments (inflows) among competitors. Moreover, not all stocks are built in exactly the same way. Several characteristics of stock accumulation processes influence the time and cost of imitation. Some relate to asset mass efficiencies (or economies of resource accumulation), where ‘(initial) success breeds (further) success’, helping first movers to sustain their lead. A second set of processes relate to ► **diseconomies of time compression**, that is, the time-cost trade-offs in the accumulation and imitation of resources.

This entry focuses on asset mass efficiencies, first describing the concept and its importance to the sustainability of competitive advantage. It then focuses on the drivers of asset mass efficiencies. The mechanism is illustrated using stylized stocks–flows simulations with the iThink software. The entry builds on research of Dierickx and Cool (1989), Cool et al. (2002) and Almeida Costa et al. (2013) and draws from, and contributes to, the extensive literature on the resource-based view of the firm and dynamic capabilities (e.g., Wernerfelt 1984, 2011; Barney 1986; Conner 1991; Peteraf 1993; Maijoor and van Witteloostuijn 1996; Teece et al. 1997; Makadok 2001, 2010, 2011; Foss and Knudsen 2003; Peteraf and Barney 2003; Armstrong and Shimizu 2007; Barney and Clark 2007; Pacheco-de-Almeida and Zemsky 2007; Barney et al. 2011).

### The Exponential ‘Success-Breeds-Success’ Mechanism

When Facebook became the social network of choice at Harvard, it soon found that students at

several other Ivy League schools were eager to be part of the network. And as these students adopted Facebook, students from colleges all over the US clamoured to become part of the network, which drove high school students in huge masses to the network. Similarly, when the iPhone became the smartphone of choice among the early adopters, Apple soon found that it was easier to motivate writers of apps to bring these out for the iPhone, which compelled even more customers to buy the popular phone, which motivated even more suppliers of apps to join the Apple ecosystem.

The above examples point to the presence of asset mass efficiencies or economies of accumulation in the creation of the resources: businesses that develop a high level of an asset stock (e.g., user base, brand awareness, applications) before competitors, achieve an increase in the asset stock at a lower effort or cost than competitors. More formally: if the equation of motion describing the accumulation process for an asset  $A$  is given by

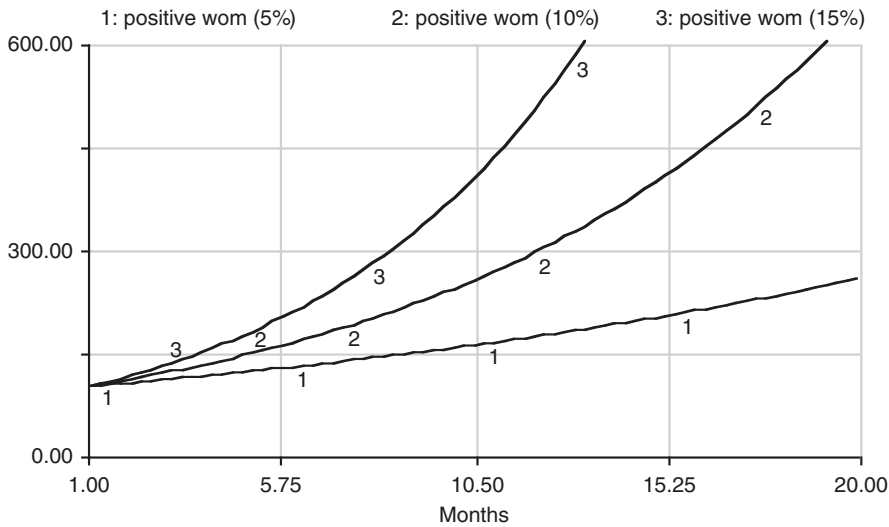
$$\dot{A} = f(A, \dots)$$

then asset mass efficiencies are defined by

$$\partial f / \partial A > 0.$$

As the difficulties of Motorola, Sony, RIM and Nokia illustrate, building an asset base once a competitor benefits from asset mass efficiencies becomes increasingly difficult, enhancing the advantage of the first mover.

The phenomenon that is at work in the Facebook and iPhone examples is *the exponential growth process of asset stocks*. It operates in a similar way to the accumulation of financial capital in a fixed rate investment where interest is compounded. Left to itself, a starting capital will grow exponentially, since each year interest is obtained on a larger capital base. In the case of Facebook, there was an exponential growth of the social network’s user base because of a ‘word-of-mouth’ capitalization effect. The rate at which users encourage others to join the network may be compared with the interest rate. The number of users that, at a given stage, are part of the network may be considered the starting capital of the social



**Asset Mass Efficiencies, Fig. 1** Positive word-of-mouth effects

network service. The multiplication of the word-of-mouth rate with the starting capital gives an indication of the number of new people per period (month, year etc.) who become members of the network. That is, the inflow at any time is proportional to the size of the asset stock. The higher the stock, the higher is its growth, leading to a higher stock and so on.

The success-breeds-success growth process is illustrated in Fig. 1. It traces an initial customer base (for convenience set at 100) in which each month the word-of-mouth effect brings an additional 5% (line 1), 10% (line 2) or 15% (line 3) of customers. The graph shows the exponential growth of the customer base. It also shows that the higher the rate at which customers talk, the higher the growth of the customer base and the higher the resulting brand awareness or user base.

The exponential accumulation process has direct implications for the competitive position of businesses. If customers talk about competing brands *at the same rate*, then the gap between the firm that was early to start a word-of-mouth campaign and a follower grows with time. Figure 2 shows the evolution of a customer base of 100 (line 1) and 300 (line 2). The relative size of the two bases stays the same because they grow at the same rate. However, the gap in numbers of customers steadily increases because of the

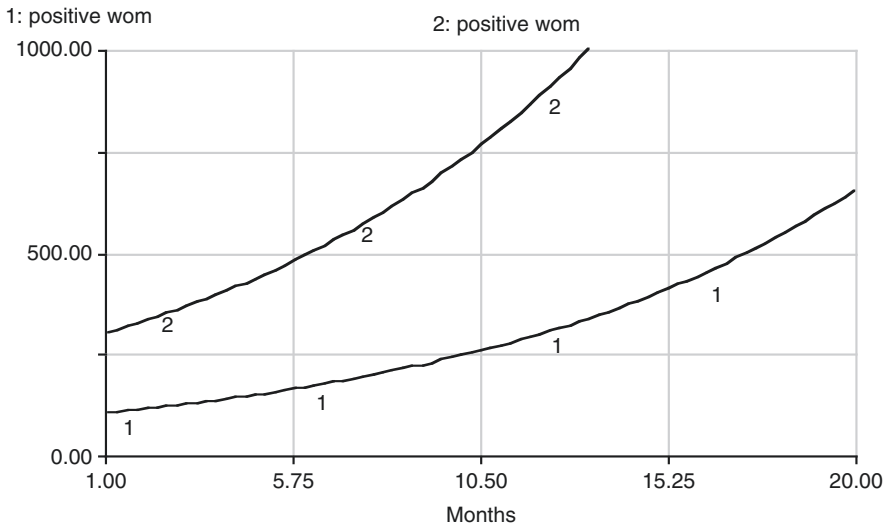
difference in the initial base. Firm 2 would have to mount an effort several times its flow to overcome the shortfall of its asset stock with Firm 1. For example, at the end of the 12th month, Firm 1 would have to obtain an inflow of new customers that is more than 20 times the size of the inflow of the 12th month to catch up with Firm 2. While possible, the cost may be prohibitive.

### Drivers of Asset Mass Efficiencies (Economies of Resource Accumulation)

In what situations do success-breeds-success processes in the creation of asset stocks occur? In what situations do firms that build high resource levels before the competitors benefit from the compounding process shown above?

### Evaluation of the Product Before the Purchase

Many products can be assessed only after they have been paid for. For example, the choice of a life insurance policy, restaurant, travel tour package, business school, consultant, investment banker and so on can be judged only after the fact. Consumers with limited experience therefore tend to seek advice or rely on the word-of-mouth information on the various options. Products and services that were first to



**Asset Mass Efficiencies, Fig. 2** Word-of-mouth effects with a different initial base

build a large word-of-mouth capital have a head start that results in an increasing gap with followers. This gap will become even bigger if early movers succeed in achieving a higher ‘capitalization rate’.

These experience effects are frequently found in the services sector. Since every ‘product’ is made on the spot, is affected by conditions at the time of the consumption and may need the active involvement of the customer (e.g., travel, implementation of consulting recommendations), there is potentially a high variance in the quality of the outcome. The medical profession illustrates this very well. Doctors often need the compliance of the patient to achieve a satisfactory medical result of a treatment. Since, in addition, many drugs have (benign) side effects and often are taken in combination with other drugs, serious side effects may unexpectedly develop in some patients. This produces risk-averse prescription behaviour, well known in the medical sector. Pharmaceutical companies, recognizing the critical role of word-of-mouth effects, try to beat competitors to the market with a new drug. Once a new drug has obtained the endorsement of leading physicians in prestigious teaching hospitals, the medical profession tends to quickly converge on the new leader and only reluctantly considers latecomers.

**Product Durability**

Experience effects are also found in markets where products are durable and where operating failure heavily disrupts ongoing operations (e.g., aircraft, house construction, paper-making machinery, major home appliances). Since the customers may have to live with the consequences of their choice for a considerable period of time, risk-averse behaviour is observed: many customers buy what others say is best. One of the major initial difficulties of the European Airbus consortium was its lack of credible proof concerning the longevity of its aircraft and the resale value of its aircraft after a period of use. Similarly, entry into the aero-engine business is virtually blocked because of the extreme degree of risk-averse behaviour on the part of aircraft manufacturers and airlines. The engine manufacturers are further helped by the need to have a worldwide repair and spare parts network that needs to be ready to service planes at very short notice. A similar stability is found in the market for paper-making equipment. Since this equipment may last over 40 years, customers want to be well informed about the potential choices: they visit competitors’ plants, exchange information and so on. This, again, produces conservative buying behaviour.



### **Trial Costs**

Trial costs also substantially affect the degree to which customers are risk averse. Food products have an experience component since they can be assessed only after their purchase. However, their trial cost is often too low to protect established brands. Too high a price difference between well-known brands and follower brands frequently induces switching. The success of distributors' brands in retail shows that a (minimal) reassurance leads to significant switching by the customer. In contrast, reputation is very important for exclusive restaurants because their trial cost is often considered substantial for many customers.

### **Dependence on a Network**

Success-breeds-success dynamics are frequently observed when products have network characteristics, that is, when the value a customer derives from a product or service is dependent on the size of the network that is being accessed. Social networks, search engines and open networks such as Android are prime examples of this. Similarly, renting cars or moving equipment is most convenient from rental firms that have developed a large number of rental points. Likewise, advertisers want to advertise in media that have the highest penetration in a target market. In all of the above situations, firms that are first to build a large stock of users are able to grow their stock with less investment than competitors with a smaller base, since most customers seek to be part of the larger network.

### **Transport Cost to Serve a Network**

Cost advantages to firms with a large installed base naturally occur when there are transport costs to serve the base. For example, express delivery services such as UPS, Federal Express or DHL can substantially reduce the delivery cost per customer in a given area if they achieve a high market penetration. Similar economies are observed in the soft drinks and cigarette businesses, where a key element is the achievement of local distribution in vending machines. A high penetration of machines boosts sales and reduces distribution costs. Unilever has built a very strong

position in the impulse ice-cream market in Europe in a comparable manner. To quickly develop a vast base of outlets, it provided icecream cabinets to large numbers of corner shops for nothing, in return for exclusive supply. The high density of ice-cream cabinets in a given area enabled Unilever to replenish the cabinets in a very cost-efficient way. In addition, it made media advertising cost effective. Latecomers such as Mars found it impossible to close the gap with Unilever's installed base.

### **Impulse Characteristics of Products**

Network effects may also be found in products or services with impulse characteristics (e.g., fast food, ice cream, video rental). In these products, sales are triggered by the local availability of the product, but are strongly determined by a customer's previous experience with the product, possibly in other locations. Chains like McDonald's, Burger King or Starbucks attempt to have many locations per area. In addition to possible transport cost advantages, having many locations enables them to capture the wandering customers when they feel like having a burger or coffee.

### **Host-Complement Interactions**

When a 'complementary' product is needed to add functionality to a 'host' product, the firm that succeeds in building a large stock of either product is likely to stimulate the demand of the other product, which in turn stimulates the demand for the complement. Thus, initial success breeds further success, and latecomers have to incur an increasingly larger cost to convince reluctant customers to join the smaller network. This has been observed, among others, in the computer industry (software and hardware), consumer electronics (cameras and lenses), the car industry (sales network and service network), video consoles and games, and smartphones.

More generally, the presence of complementarities between the host and the complement implies that the size of the stock of the host products drives the increase (inflow) of the stock of complements, while the size of the stock of complementary products drives the increase in the

stock of the host products. A numerical example may illustrate these host-complement interactions. Consider two firms A and B that compete in the markets of the host and the complementary products. A has a stock of host products of 70 and a stock of complements of 7; B has stocks of host and complements of 30 and 3 respectively. To track the evolution of the stocks over time, we need to know at what rate the stocks of hosts and complements capitalize. If this rate would be 0.10 for firm A, the increase in the stock of host products for A in the first year would be 0.7 (i.e., 7 times 0.1). That is, roughly one unit would be added to the stock of host products because of the availability of its stock of complementary products. For simplicity, let us assume that the capitalization rate is the same for the stocks of host and complement. In this case, the increase of the stock of complements for A in the first year would be 7 (i.e., 70 times 0.1).

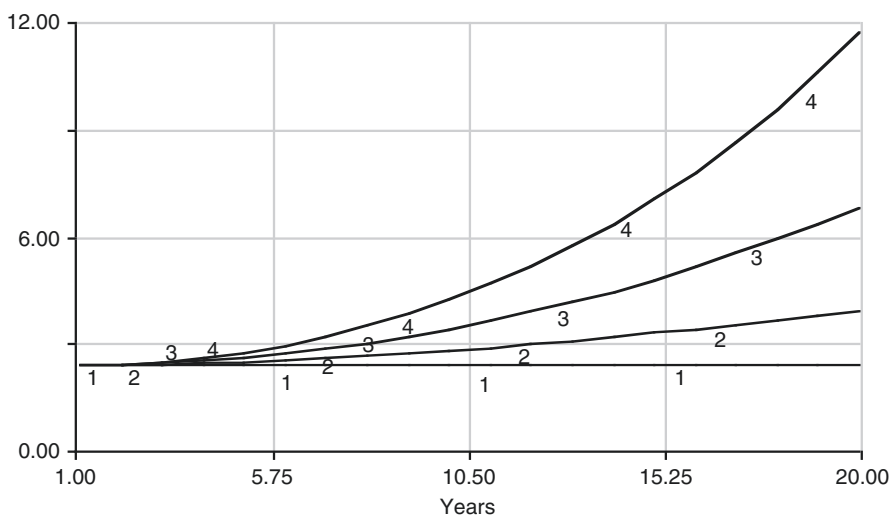
Figure 3 shows the ratio of the stock of host products A and B if the capitalization rate for A is 5% (line 1), 10% (line 2), 15% (line 3) and 20% (line 4). In each case, the capitalization rate for B is maintained at 5% in view of its smaller stock of host and complementary products. Figure 3 shows the success-breeds-success dynamics of the host-complement interaction. It demonstrates how quickly a firm that was first to build an

installed base increases its lead, and the predicament of a follower whose rate of growth of its stocks falls behind that of its competitor. While the initial differences were not dramatic (70/30), firm B quickly falls behind, and more so when firm A can capitalize its lead at a higher rate.

**Complementarity of Resources**

Success-breeds-success dynamics may also unfold when complementary resources affected by asset mass efficiencies are needed in the production of a product. Consider the market for credit cards. A handful of cards (Visa, MasterCard, American Express, Diners) have dominated credit card use during the past 40 years. This is not for a lack of entrants; a host of large companies in retail, oil, travel, for example, entered, only to find out how difficult it is to keep clients. Why are the positions of the entrenched players in the credit card market so stable?

Each credit card network needs at least two stocks, a stock of customers and a stock of businesses that accept the credit cards. Customers deciding which credit card to choose will typically take a card they think will be accepted in the largest number of businesses. Shop owners, restaurants and hotels typically accept the credit cards they think are held by most customers;



**Asset Mass Efficiencies, Fig. 3** Ratio of the stock of rival host products

otherwise they would be turning away business. As new shops follow the lead of existing shops, the stock of businesses that accept these cards increases with time, which increases the number of customers with the credit card. The well-known credit cards have attempted to consolidate their lead over other cards by providing customers access to stocks of complementary products. For example, American Express has associated itself with frequent flier programmes, car rental and so on. When its card is used in booking these services, American Express provides, for example, extra ‘free miles’ or car upgrades. The combined effect of complementary products and resources produces a very strong success-breeds-success dynamic.

### Conclusion

This entry examined resource sustainability from an imitation angle. Specifically, we described situations in which the accumulation of a resource benefits from a ‘success-breeds-success’ dynamic that creates an exponentially growing gap between resource levels of early movers and imitators. Early movers can expect such an advantage where products or services have high evaluation costs, durability, trial costs, network value and cost, impulse characteristics and dependence on complementary products. Where the accumulation of one resource depends on the level of another resource, accumulation economies may also be expected.

For example, Novo Nordisk created in the insulin market an increasing gap from followers both in R&D and installed base when it changed insulin from a commodity product into a host-complement system, with its set of Novopens and other delivery mechanisms. Similarly, Monsanto, with the ‘Roundup-ready’ family of seeds, left many other herbicide and seed companies in the dust as it pursued its host-complement strategy. In a similar vein, S&P Capital IQ has constructed a fully integrated system of financial and market databases that allow analysts to obtain more value from integrated use than from a separate use of the individual components.

When the accumulation processes for key resources are characterized by asset mass

efficiencies (economies of resource accumulation), firms that already have important resource stocks may be able to leverage this advantage to increase their lead over rivals lacking comparable resource endowments.

### See Also

- ▶ [Competitive Advantage](#)
- ▶ [Complementary Asset](#)
- ▶ [Diseconomies of Time Compression](#)
- ▶ [Dynamics of Resource Erosion, the](#)
- ▶ [First-Mover Advantage](#)
- ▶ [Resource-Based Theories](#)

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its capabilities in order to create a new or sustain a current ► **competitive advantage** (Teece et al. 1997). According to Teece (1997), dynamic capabilities involve the creation, extension, protection and maintenance of relevant unique assets for an organization. As an extension, Adner and Helfat (2003) proposed the concept of ► **dynamic managerial capabilities**, which involve actions that build, integrate and reconfigure organizational resources and capabilities. Teece (2007) explains that firms maintain their level of competitiveness by enhancing, combining, protecting and reconfiguring (as needed) their assets.

In the Teece et al. (1997) original work, three processes were proposed as core elements of dynamic capabilities: coordinating/integrating, learning and reconfiguring. Teece (2007) suggests that the combination of these three processes represents asset orchestration. Helfat and colleagues (2007) and Adner and Helfat (2003) suggest that asset orchestration includes two primary processes: search/selection and configuration/deployment. The search/selection process involves identifying the assets and investing in them. And, then, a governance system should be developed and a means for their effective use identified. Following these actions, the configuration/deployment processes are engaged. These processes involve the coordination of co-specialized assets and their use in productive ways. Teece (2007) describes co-specialized assets as a specific type of complementary asset in which the value of one asset is a function of its use with another asset. Synergy is thus created by the use of these assets in combination, thereby producing greater value.

Although developed independently, Helfat and Peteraf (2003) suggested that dynamic capabilities and ► **resource based theories** were complementary, thus their integration could create value. In fact, until recent research, much resource-based theory has overlooked the managerial component suggested by dynamic capabilities. In support, recent work suggests that having valuable, rare, inimitable and non-substitutable resources is a necessary but insufficient condition to gain a competitive advantage. In order to produce a competitive advantage, those resources must also be

## Asset Orchestration

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**Definition** Asset orchestration involves identifying the critical assets and investing in them (search/selection), and then developing a governance system along with a means for their effective use identified. The second part of asset orchestration involves the coordination of co-specialized assets and their use in productive ways (configuration/deployment).

Asset orchestration is a critical component of ► **dynamic capabilities**. Stated simply, a dynamic capability allows an organization to reconfigure

managed and used in ways to create superior value for customers (Sirmon et al. 2007). Sirmon et al. (2007) suggested that managing resources involved structuring the resource portfolio, ► **bundling** resources to build capabilities and then leveraging those capabilities to take advantage of market opportunities to create a competitive advantage. The structuring of the resource portfolio (acquiring, developing and divesting resources) largely overlaps with the search/selection processes described by Adner and Helfat (2003) as a component of asset orchestration. Additionally, the bundling processes to create capabilities and the leveraging processes that involve deployment strategies overlap with the configuration/deployment processes in asset orchestration described by Adner and Helfat (2003). Based on the complementarities between dynamic capabilities and resource-based theory (Helfat and Peteraf 2003) and the clear complementarity and, indeed, partial overlap in processes between resource management and asset orchestration, Sirmon and colleagues (2011) recommended that these two constructs should be integrated into the notion of resource orchestration. Integrating these two processes provides a clear and detailed roadmap for orchestrating resources in ways that create dynamic capabilities, leading to the development of a sustainable competitive advantage. The work of Adner and Helfat (2003) and Sirmon and Hitt (2009) also suggests the importance of fit among these various processes for optimum outcomes. For example, to create specific types of capabilities, certain co-specialized assets/resources are required. Therefore, the bundling and resource acquisition processes must be coordinated carefully. Likewise, the strategies employed to leverage the capabilities must match well the type of capabilities created through bundling. Sirmon and Hitt (2009) found that when the strategy and capabilities are synchronized performance was enhanced, but when they did not fit performance was disadvantaged.

Therefore, dynamic capabilities and resource-based theory are complementary. The resource orchestration construct facilitates the integration of dynamic capabilities and resource-based

theory. With such an integration, we have a better understanding of dynamic managerial capabilities, that is, how managers orchestrate assets/resources to create capabilities and leverage those capabilities to achieve a sustainable competitive advantage.

## See Also

- [Barney, Jay Bryan \(Born 1954\)](#)
- [Bundling and Tying](#)
- [Capability Development](#)
- [Competitive Advantage](#)
- [Dynamic Capabilities](#)
- [Dynamic Managerial Capabilities](#)
- [Hitt, Michael A. \(Born 1946\)](#)
- [Resource-Based Theories](#)
- [Resource-Based View](#)
- [Teece, David J. \(Born 1948\)](#)

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## Asymmetric Information

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### Abstract

The product of momentous advances in economic theory, the concept of asymmetric information is of great relevance to strategic management. The effects of asymmetric information primarily involve unobserved characteristics or actions that result in ► [adverse selection](#) and ► [moral hazard](#). Signaling and screening may remedy adverse selection, and optimal contract design may remedy moral hazard. Notable uses include quality disclosure, firm capitalization, limit pricing and advertising.

**Definition** Asymmetric information is a state where one party has or will have a greater level of knowledge relative to another party about their own characteristics or actions.

Virtually all organizational decisions involve asymmetric information, including those entailing the employer hiring and monitoring employees, pricing products, buying inputs, accessing capital or market entry. As economists have discovered, in any of these contexts, information asymmetry has a profound effect on both individual decisions and market outcomes.

The incorporation of asymmetric information revolutionizes many of the fundamental findings of economic theory. As Stiglitz (2000, 2002) notes, standard economics results (i.e., on marginal cost pricing, efficiency wages, full employment, markets with one price, efficient asset prices and Pareto efficiency) may not hold under asymmetric information. While theoretical recent work has begun to incorporate elements of asymmetric information in a general equilibrium model (e.g., Bisin and Gottardi 2006; Zame 2007), most economics and strategic management literature adapts to these settings by providing novel strategies for organizations.

This article overviews economic and strategic management research involving asymmetric information and provides additional applications of these models relevant to strategic management. Areas of asymmetric information fall under two categories: *unobserved characteristics*, or transactions where one side knows more about the goods and services being transacted than the other does, and *unobserved actions*, or strategic interactions where one party will be unable to observe the future actions of the other.

### Asymmetric Information with Unobserved Characteristics: Adverse Selection

In the most well-known model of asymmetric information, Akerlof (1970) explains that any used car market is characterized by ► [adverse selection](#): the average quality of cars on the market is worse than the average quality of all used cars. Sellers know the quality of their cars; buyers lack this information. If buyers cannot differentiate on quality, they must pay the same price for all used cars. Sellers of sufficiently high-quality cars will not be willing to sell at the market price, but sellers of low-quality cars will be happy to dump them on the market, leading to a lower-than-average-quality used car market.

Akerlof's finding – that asymmetric information in a competitive market produces inefficiency – has profound implications. In the used car market, high-quality cars cannot be sold, even if buyers would be willing to pay a price greater than the seller's valuation if they knew a car's true quality. Buyers cannot distinguish high-quality cars from others and cannot believe sellers' claims because any seller could make such claims.

Since the strategy of firms fundamentally involves markets, adverse selection has clear applications to strategic management; indeed, any market with features similar to those of the used car market may feature adverse selection. Recent studies find it in markets for insurance (Finkelstein and Poterba 2004; Einav et al. 2010), used aircraft (Gilligan 2004) and

even Mauritian slaves (Dionne et al. 2009). Recent theoretical work shows adverse selection can explain the limited use of electronic markets (Overby and Jap 2009) and the absence of private unemployment insurance (Chiu and Karni 1998).

### **Solutions to Adverse Selection: Signalling and Screening**

Unlike Akerlof's used car market, most markets can overcome information asymmetry because they feature methods that enable the uninformed side to become informed, thus allowing transactions to take place. Two similar solutions, signalling and *screening*, differ concerning which party acts first. In signalling, the informed party credibly discloses private information. By contrast, screening occurs when the uninformed party provides a mechanism to incentivize the informed party to credibly disclose private information.

In the first discussion of signalling, Spence (1973) reasons that, like the used car market, labour markets feature individuals who are higher quality (more productive) than others. It is in the interest of firms to employ all workers but to pay more (less) than an average wage for more (less) productive workers. Yet, without information about workers' characteristics, employers must pay a uniform wage.

The situation is not as dire as the used car market, however, because highly productive workers have ways to signal their characteristics. Spence reasons that high-productivity individuals can take classes to show their superior productivity. Low-productivity types may prefer to avoid mentally taxing schooling and accept lower-paying jobs, while high-productivity individuals would be more willing to take the classes necessary to acquire high-paying jobs. In this manner, both types truthfully reveal their quality by choosing different courses of action. Interestingly, this initial result does not require any productivity returns on education (though Spence (2002) includes such a feature). Empirical investigations support the predictions of education as a signal (Bedard 2001).

Signalling is a popular topic in the field of strategic management (Connelly et al. 2011,

provide a survey), as firms desire to signal their strength and that of their products. Most notably, a firm can benefit by signalling through the composition of its board (Higgins and Gulati 2006; Miller and Del Carmen Triana 2009) and CEO (Zhang and Wierseman 2009), corporate restructuring (Bergh et al. 2008), adding '.com' to their name (Lee 2001), their geographic scope (Bell et al. 2008) and interorganizational partnerships (Gulati and Higgins 2003).

In a seminal example of screening, Rothschild and Stiglitz (1976) consider an insurance company that offers the same policy to all customers because it is unable to differentiate customers' riskiness. The policy is competitive, allowing a customer with average risk to break even; thus, the policy is profitable (not profitable) for all customers who have above- (below-) average risk. This leads to adverse selection, as the riskiness of consumers who buy this policy will be greater than that of the general population. Thus, the insurance company will lose money on this policy. Alternatively, the insurance company could design multiple contracts that customers can select based on their potential riskiness, a process called *screening*. Rothschild and Stiglitz find that when conditions for screening do not exist, a rational insurance company will offer no policies.

Most empirical work involving screening concerns insurance markets (Newhouse 1996; Fang et al. 2008). Other applied work includes designing optimal debt instruments (Biais and Mariotti 2005), educational policies (de Fraja 2002), and gate-keeping usage in market transactions (Shumsky and Pinker 2003). The earliest theoretical work on screening predates Akerlof; Vickrey (1961) and Mirrlees (1971) share a Nobel Prize for their work on the optimal design of auctions and income taxation, respectively.

### **Equilibrium Concepts in Signalling and Screening Games**

The results of Rothschild and Stiglitz (1976) and additional equilibrium refinements (Kreps and Wilson 1982; Milgrom and Roberts 1982) provide three general types of equilibria in signalling and

screening games. In pooling equilibria, all types of players with varying characteristics choose the same action, causing the uninformed party to learn nothing at equilibrium. Conversely, in a separating equilibrium, each type of player performs a different action, revealing his type to the uninformed player. In a semi-separating equilibria, one or more types randomizes over possible actions, allowing the uninformed party to make better inferences about the types of the informed party.

In many of these games, such as with Spence's signalling model, there can exist a multitude of these types of equilibria. Riley (1979) proposes a criterion to eliminate some of the more unintuitive, Pareto inefficient equilibria. Cho and Kreps (1987), Banks and Sobel (1987), and Cho and Sobel (1990) develop equilibrium refinements, under which, if certain assumptions are met, the remaining equilibria all satisfy the Riley criterion.

### **Asymmetric Information with Unobserved Actions: Moral Hazard**

The aforementioned examples of asymmetric information all concern unobservable characteristics: those that are known in the present time to the informed party. In another class of asymmetric information known as unobservable actions, at the time of transaction, one party's future actions will be unobservable to the other. If this information asymmetry causes the informed party to behave in a way detrimental to the uninformed party, then there is a ► [moral hazard](#) (Arrow 1971).

An example of moral hazard involves an employer paying an employee for unobserved services. With a fixed wage, the employee has the incentive to shirk. Other contracts alleviate this issue; both Stiglitz (1974) and Akerlof (1976) note that sharecropping features contracts where sharecroppers receive a share of the harvest, thus giving them an incentive to work hard. Hart and Holmstrom (1987) provide a description of optimal contracts under a variety of situations. In the strategic management literature, Perkins and Hendry (2005) and Sliwka (2007) empirically examine contracts for executives where moral hazard exists.

In situations where such contracts are impossible, wages generally must be higher than market-clearing levels to induce worker productivity. Both the threat of unemployment (Shapiro and Stiglitz 1984) and the desire for positive reciprocity (Akerlof and Yellen 1990) may motivate workers to increase productivity and thus underlie management's reasons for higher wages. Survey and empirical data confirm that these factors affect labour market performance (Bewley 1999).

### **Applications to Other Types of Strategic Management**

Milgrom (1981) and Grossman (1981) both theorize that a market failure need not occur with asymmetric information, provided sellers have the option to credibly disclose quality. At equilibrium, competitive forces cause sellers to reveal all quality information to buyers. However, Dranove and Jin (2010) provide a survey of empirical literature on this topic and rarely find full disclosure. They reason that the numerous assumptions required for this equilibrium prediction to hold are unlikely to be satisfied in most settings. Brown et al. (2012; [forthcoming](#)) argue that the assumption of full strategic thinking is largely responsible for the lack of total disclosure and find empirical support in the motion picture industry.

Myers and Majluf (1984) argue that the stock market has an adverse selection of low-profitability (low-quality) firms. Since some investors cannot differentiate firm quality, the market undervalues high-profitability firms and overvalues low-profitability firms. This incentivizes highly profitable firms to finance their projects with debt and low-profitability firms to issue more stock, leading to adverse selection. John and Williams (1985) suggest high-quality firms overcome this problem by signalling their profitability through dividends, a signal too costly for low-profitability firms. Recent management research suggests that private (rather than public) investment also functions as a signal for profitability (Janney and Folta 2003, 2006; Busenitz et al. 2005).

Economists often theorize that monopolies use limit prices, or prices that are lower than profit-maximizing to deter other firms from entering their market. Milgrom and Roberts (1982) provide a model of this pricing where a monopoly signals its competitive strength to possible new firms through limit pricing or profit maximizing. In the model, weaker firms have an incentive to use limit pricing to mimic stronger firms and deter firm entry. Equilibrium conditions exist for pooling, separating and semi-separating equilibria. Extensions of this model are prevalent in economics and industrial organization literature (Tirole 1988; Riley 2001, provide surveys). For example, Srinivasan (1991) expands the standard model to allow the monopolist to limit price across several markets.

Signalling provides an excellent justification of corporate advertising expenditure. Nelson (1974) suggests that advertising may be beneficial for products where purchase is necessary to determine quality. Klein and Leffler (1981) and Milgrom and Roberts (1986) formalize Nelson's ideas in models where firms with high-quality products benefit from advertising, provided they will have repeated interactions with customers. In further extensions, Kihlstrom and Riordan (1984) argue that with identical quality goods, equilibria exist where all firms advertise the same amount. Wernerfelt (1988) examines how a multiproduct firm can promote all products by signalling its general firm quality. In recent empirical work, Basuroy et al. (2006) find evidence of advertising as a signal in the motion picture industry.

## See Also

- ▶ [Adverse Selection](#)
- ▶ [Moral Hazard](#)

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## Austrian Economics

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### Abstract

This article briefly surveys the relations between key Austrian economics themes such as the market process aspects of competition, the subjectivity of economic value, methodological individualism, resource heterogeneity, distributed knowledge, the time-structure of production and the entrepreneur, and modern strategy thinking. Parallels can be found in the knowledge-based view, the critique of strategy as planning, the emphasis on resource heterogeneity and, in the recent microfoundations emphasis, in strategic management.

**Definition** Austrian economics emphasizes the process aspects of competition, subjectivity of economic value, methodological individualism, resource heterogeneity, distributed knowledge, the time-structure of production and the entrepreneur. Key Austrian economists are Carl Menger, Friedrich von Hayek, Ludwig von Mises and Israel Kirzner.

In terms of direct influence, the impact of Austrian economics (AE) on strategic management is relatively limited (e.g., Jacobson 1992; Young et al. 1996; Foss et al. 2008). Different kinds of industrial economics, namely the structure-conduct-performance (SCP) approach, the Chicago–UCLA school, and game-theoretical

industrial economics, have clearly been stronger influences. Assessing the impact of AE depends somewhat on how broadly ‘Austrian’ is defined. Notably, a definition that includes Joseph Schumpeter will imply a stronger impact than one that does not. However, the points of contact and even overlap between the mainstream of strategic management and AE are many, and AE has the potential to contribute to the further development of the field.

## The Austrian School

The Austrian tradition begins with Carl Menger (1871), who emphasized the process aspects of competition, the subjectivity of economic value, marginal analysis, resource heterogeneity, distributed knowledge, the time-structure of production and the entrepreneur. Menger also stressed that social science explanations must conform to methodological individualism, that is, phenomena on the social domain should be explained in terms of the actions and interactions of individuals, taking place within an institutional setting (in itself explainable in terms of individuals’ actions and interactions).

In the 1880s and 1890s an Austrian School coalesced around Menger and his disciples, most notably Eugen von Böhm-Bawerk and Friedrich Wieser, and extended these Mengerian themes. Ludwig von Mises and Friedrich von Hayek would develop and extend the Austrian tradition in the early twentieth century (von Hayek 1948; von Mises 1949), with Israel Kirzner, Murray Rothbard, both Mises’ students, and Ludwig Lachmann, a Hayek student, making critical contributions in the 1950s, 1960s and 1970s (e.g., Kirzner 1973; Lachmann 1977).

Although the Austrian School is not homogenous (Salerno 1993), and Austrians differ, for example, in terms of how critical they are of ‘mainstream’ economics, nevertheless modern Austrians share a number of distinct basic views. Thus, Austrians insist that more attention be devoted to market processes as distinct from (Walrasian or game-theoretical) equilibria: they emphasize entrepreneurship as uncertainty-bearing, entrepreneurial appraisal and investment

(von Mises 1949), or as alertness to hitherto unnoticed opportunities for pure profit (Kirzner 1973); they are staunch methodological individualists; and they stress the essential heterogeneity of capital/resources, and the fundamental subjectivity of costs and ► [expectations](#) (Lachmann 1977).

## Applying Austrian Economics to Strategic Management

AE has had some, albeit limited, direct influence on the evolution of strategic management, for example on work on competitive dynamics (Young et al. 1996), entrepreneurial top-management teams (Foss et al. 2008) and the tangled links between rents and costs (Lippman and Rumelt 2003). Nevertheless, there have been very significant overlaps between AE and the core of strategic management thinking since the 1990s.

For example, much of Mintzberg's (e.g., 1991) critique of the planning approach in strategic management is based on a fundamentally Hayekian (von Hayek 1948) understanding of organizations as systems of dispersed knowledge in which centralized planning and resource allocation may be inefficient relative to bottom-up processes. Moreover, the foundations of strategy's dominant ► [resource-based view](#) may be seen as strongly Austrian. For example, the point that there must be a divergence between the (acquirer's) estimate of resource value and the current price of resources for competitive advantage to exist (Barney 1986) may be seen as an application of Austrian ideas on privately held information, entrepreneurial appraisal and expectational disequilibrium (see also Denrell et al. 2003). The current strong emphasis on resource heterogeneity as underlying performance differences is closely related to the Austrian emphasis on heterogeneous, yet specific and complementary capital goods (Lachmann 1977). Notions of 'capabilities' and 'competencies' may be seen as firm-level manifestations of the kind of localized knowledge that von Hayek (1948) in particular emphasized. The emerging focus on new value creation (i.e., the emerging strategic entrepreneurship field), and

the increased interest in the dynamics of strategy (e.g., Grimm et al. 1999) may also be seen as reflecting fundamentally Austrian themes. Thus, it could be argued that there in fact is an 'Austrian school of strategy' (Jacobson 1992).

However, on closer inspection, Austrian ideas have been only imperfectly absorbed in current strategic management thinking. Much strategy thinking has a streak of methodological holism; specifically, firm-level outcomes are explained in terms of collective notions such as 'capabilities' with little or no reference to individuals and their interaction (Abell et al. 2008). Much strategy thinking is still based on equilibrium models and is therefore primarily taken up with examining the conditions under which resources may yield rents in equilibrium. Although process issues are not lacking in contemporary strategic management, the Austrian point that different men not only know different things but also from different expectations is not sufficiently addressed in thinking about the sources of new value creation, innovation and competitive advantage (Foss et al. 2008). Thinking about resource heterogeneity is fundamentally ad hoc, whereas Austrian capital theory offers a foundation for such thinking (Foss et al. 2007). Recognizing the imperfect overlap between strategic management and AE may, however, be taken as a call for more fully drawing on AE ideas in strategic management.

## See Also

- [Emergent Strategy](#)
- [Expectations](#)
- [Knowledge Management Theories](#)
- [Resource-Based View](#)

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## Autonomous Innovation

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### Abstract

An autonomous innovation can be commercialized without any accommodation by other elements of the technological system of which it is a part. This typically requires that the

system uses standardized interfaces. Although the components of such a system can evolve independently, system integration is still required in most cases to provide the full benefit (from autonomous innovation) to end users. Large firms that attempt to master all parts of an autonomous-element system may find themselves outmanoeuvred by groups of smaller rivals. Small firms within such a system must ensure that the value they create is not appropriated by others in their network.

**Definition** An autonomous innovation is one that is part of a system but which can be commercialized without requiring adjustment or innovation by the other, complementary products, particularly the other parts of the system.

An autonomous innovation is one that can be commercialized without requiring adjustment or innovation by other, complementary products. For example, a turbocharger to increase horsepower in an automobile engine can be developed without a complete redesign of the engine, much less the rest of the car (Chesbrough and Teece 1996: 67).

The opposite is a ► **systemic innovation**, which requires coordinated development among a group of products composing a unified system. The two innovation concepts were named and defined in Teece (1984).

Autonomous innovation is closely related to the concept of modular innovation (Henderson and Clark 1990; Langlois and Robertson 1992). In a modular system, all the elements are joined by standard interfaces, which enable autonomous innovation to occur. This in turn allows companies to specialize in individual elements of the system, which can, in theory, bring the advantages of the division of labour to system-level innovation. The personal computer industry – in which the operating system, application software, micro-processor, hard drive and so on are all controlled by different companies with relatively little coordination – is the primary example of a modular system that advanced in this way. The success of this model contrasts with the limited

penetration of earlier, non-modular minicomputer efforts of vertically integrated companies that adapted the integrated design methods they had used for larger-scale systems (Langlois 2002).

This is not to imply that the autonomous elements of a partially, or fully, modular system can evolve indefinitely with no coordination whatsoever. The economic function of integrating knowledge and components is always necessary, regardless of whether the components are supplied internally or externally (Pisano and Teece 2007). The more complex and high-valued the final product, the more important this system integration function becomes (Prencipe et al. 2003).

Even though the design of an autonomous innovation does not require participation from other parts of a system for its initial commercialization, changes elsewhere may allow the system to capture more of the advantages of the autonomous innovation. An example is power steering; while the automobile did not have to be redesigned to incorporate it, the availability of power steering enabled car designs that placed more weight over the front wheels (Teece 1984: 102).

According to Henderson and Clark (1990), autonomy is likely to emerge after an industry has reached a ► **dominant design**. Before then, companies will be experimenting with components and with how they work together. Langlois (2002), however, underscores an important exception because the US automotive industry began with modularity but became integrated. In the industry's early years, it was made up of assemblers buying standard, or easily modified, parts. When Henry Ford brought all the components in-house for the development of the Model T, he eventually standardized the parts to enable assembly line production, but retained control of how they worked together. Although the major US automotive manufacturers eventually used outside suppliers, for roughly 50 years after the emergence of a dominant design, the leading car makers required their suppliers to produce parts according to a detailed design. In this system, all design decisions remained centralized, leaving no autonomy to suppliers, who competed solely on price.

As the automotive example suggests, the presence of autonomous innovation in the components of a system has organizational and strategic implications. Once a modular dominant design has become established, large firms that manufacture the components using a centralized, bureaucratic structure may find themselves at a disadvantage relative to a group of small firms or large rivals with a decentralized organization (Teece 1996). In the car industry, when disc brakes began to replace drum brakes, General Motors was slow to adopt the newer system because of its existing investments, while its rivals, using outside suppliers, brought the innovation to market faster (Chesbrough and Teece 1996).

For small firms that innovate in one component of a modular system, the challenge is to avoid the loss of value from not controlling key complements (Teece 1986). This becomes a problem the weaker are the intellectual property rights associated with the innovation. Another factor, especially when property rights are weak, is the imitability of the innovation, which may hinge in part on how much tacit knowledge is embedded in it.

## See Also

- [Appropriability](#)
- [Dominant Design](#)
- [Profiting from Innovation](#)
- [System Integrators](#)
- [Systemic Innovation](#)

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