L

Law of One Price

Dmitri Kuksov
Washington University in St Louis, Olin School of Business, St Louis, MO, USA

Abstract

This article discusses the origins and modern interpretations of the economic law known as the law of one price, with particular attention given to the theoretical work on pricing and price dispersion in homogenous goods markets with incomplete information and consumer search costs for price.

Definition The law of one price states that, in a nearly perfect market, two identical goods must have nearly identical prices.

Introduction and History

The term 'law of one price' refers to the notion that, in a perfect market, two identical goods must have equal prices. Although this idea preceded the nineteenth-century formalization of economic theories, the name can largely be attributed to Alfred Marshall, who defined it in his *Principles of Economics* (1890) as

> the more nearly perfect a market is, the stronger is the tendency for the same price to be paid for the same thing at the same time in all parts of the market: but of course if the market is large, allowance must be made for the expense of delivering the goods to different purchasers.

(Although Marshall probably borrowed this notion from William Jevons' *Theory of Political Economy* (1871), which states 'In the same open market, at any one moment, there cannot be two prices for the same kind of article', the very fact that Jevons referred to it as the 'law of indifference' rather than the 'law of one price' suggests that the latter term does indeed belong to Marshall.)

Initially, the economic theory was most commonly used to explain the prices of commodities. Thus, the law of one price has been widely used in international trade theories as stating that, without regulatory constraints, the prices of a commodity in different countries at any given time should be the same after properly accounting for taxes, transport costs, currency exchange rates and other similar monetary factors. As applied to currency exchange rates, the law is sometimes interpreted as implying that, in the absence of government intervention, purchasing power parity exchange rates should equal open market exchange rates (see, e.g., Isard 1977). The theoretical appeal of this interpretation diminished after it has been noted that, in the deregulated and increasingly open economies of the post-Second World War era, purchasing power parity often diverges greatly from the official open-market exchange rate. Whether this is due to a failure of theory or a measurement error is not

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necessarily clear: since different countries have different economic structures and degrees of economic monetization, purchasing power parity is not easy to ascertain for sure.

As applied to financial markets, the law of one price is often restated as the law whereby securities with identical state-specific payoffs will have identical prices. In other words, two different goods valued for the stream of payoffs they provide will have equal prices regardless of their composition provided that the streams of payoffs are the same. Again, some deviations have been noted (see, e.g., Lamont and Thaler 2003); but, of course, whenever there is a discrepancy one can question whether there are states of nature not usually considered in which payoffs are different (such as, for example, a nationalization of a market economy or the bankruptcy of a company in which the beneficiaries are not clear and are decided by a court).

A third and more direct application of the law of one price is that, at any one time in a 'nearly perfect' market, prices of a homogenous good (such as a particular edition of a certain book) must be nearly the same. The remainder of this article will consider the appropriate interpretations of and qualifications for this statement.

Information Asymmetry and the Law of One Price

There are two caveats to confirming (testing) whether the law of one price holds in practice. The first one is that it is supposed to hold only in equilibrium. For example, according to Jevons, a market in which this law does not apply is 'clearly' (i.e., by definition) not in equilibrium. The second one is the definition of what it means for a market to be perfect. In the simplest interpretation, this means that the market is free from regulation and is driven by economic incentives. Clearly, this is not enough. Although the early economists were not concentrating on the role of incomplete information, they generally stipulated that a perfect market should also allow all economic agents easy and free access to information. In practice, information is never completely free since it has at least a time or a mental cost.

It seems intuitive that the outcome of such a 'nearly perfect' market should be the same as the outcome of a perfect market, that is, with prices equal and defined by the intersection of supply and demand curves. Although intuitive, the above argument is actually circular: it assumes that market agents obtain the information, even though there is nothing to gain by obtaining more information if the law of one price already applies. Careful theoretical consideration suggests that any, even infinitesimally small, costs of price information in equilibrium result in monopolistic market competition unless market participants face incomplete information (Diamond 1971).

To appreciate the philosophical issue in relation to the applicability of the law of one price to realistic markets, let us consider the following argument, reprinted here with minor changes from Butters (1977) (although the argument itself belongs to Diamond 1971). Assume a particular equilibrium with a price distribution known to all agents and consider buyers all having a cost of search greater than some positive lower bound c. Suppose the lowest price in the price distribution is below the monopoly price. Then the seller charging this lowest price could increase it by a small amount (lower than c) without provoking further search and thus without losing any demand to competitors. Therefore in the vicinity of the lowest price, the incentives of the seller are the same as those of a monopolist, and thus the lowest price is equal to the monopoly price. It is equally easy to argue that the highest price is at most the monopoly price, and thus all prices are the same and equal to the monopoly price.

Subsequently, a number of theoretical models were developed to address the problem of monopolistic price. These normally assume a large degree of uncertainty (e.g., Reinganum 1979; Stiglitz 1979) or a strictly positive fraction of consumers with perfect information (e.g., Varian 1980; Stahl 1989); another interpretation of the differences in consumer behaviour is that some consumers are loyal rather than uninformed: see Narasimhan (1988); see also Villas-Boas (1995), for some empirical support of such mixed-strategy equilibrium in a CPG market and Lal and Villas-Boas (1998), for a characterization of the

equilibrium price dispersion in a channel with multiproduct retailers) to obtain price reduction considerably below the monopoly price, although Kuksov (2006) shows that (small) uncertainty about market fundamentals in the amount proportional to the (small) consumer search costs is enough to counteract the anti-competitive effect of buyer search costs. An alternative possibility is to change the notion of equilibrium (e.g., Baye and Morgan 2004).

Distinguishing incomplete information, which implies unobservable exogenous variation of market fundamentals driving variability in unobservable actions, from imperfect information, which is due only to actions not being observable, one can then formulate the above discussion as stating that, in the absence of perfect information, incomplete information is essential for market outcomes to be nearly perfect. Note that uncertainty (in the sense of incomplete information) about product features could also resolve the above paradox of monopoly price in a 'nearly perfectly competitive' market (e.g., Anderson and Renault 1999), but such uncertainty is contrary to the identical-product assumption of the law of one price.

The Internet provided an attractive empirical setting to test whether the arguably much lower search costs for price result in a strong tendency for the same price to be paid for the same thing at the same time in all parts of the market. Several empirical studies (e.g., Brynjolfsson and Smith 2000; Clay et al. 2002; Clemons et al. 2002; Baye and Morgan 2004) found that the price dispersion online is significant and, depending on the measure used, may be higher than offline (Brynjolfsson and Smith 2000). Kuksov (2004) argues that one possible explanation is endogenously increased seller differentiation. Baye and Morgan (2005) and Iyer and Pazgal (2003) also consider the effect of endogenous market structure on price dispersion.

An additional complication with comparing the internet marketplace to the offline market is that the Internet has many more sellers. Some theoretical research suggests that uncertainty about prices may lead to the possibility of higher prices and price dispersion when the number of firms is higher (Stiglitz 1987; Kuksov 2006).

See Also

- ▶ Arbitrage and Its Limits
- ▶ Market Price

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Leadership

Jennifer A. Chatman[1] and David F. Caldwell[2]
[1]University of California Berkely, Haas School of Business, Berkeley, CA, USA
[2]University of Santa Clara, Santa Clara, CA, USA

Abstract

Leadership has been a defining focus in organizational research, and yet critical questions remain about the specific mechanisms by which leaders affect strategy and performance. We argue that, in addition to factors such as their individual attributes and behaviours, leaders who create and maintain a strategically relevant organizational culture and establish consistency in strategic orientation among their management teams enable their organizations to perform well. We also suggest that the very status that enables leaders to shape their organization also subjects them to the biases that are associated with attaining power.

Definition Leadership in an organization is an individual's ability to move others towards a common goal. It may arise from a person's position in the hierarchy or from his or her actions or characteristics.

Leadership has been a key concept in organizational behaviour for over 70 years and, unsurprisingly, there have been a wide variety of approaches for studying leadership. Researchers have investigated leaders' individual characteristics (e.g., Agle et al. 2006; Zaccaro 2007), behaviours (e.g., House and Mitchell 1974) and how their actions affect subordinates' motives and performance (Wang et al. 2011) at many levels of analysis ranging from how first-line supervisors affect individual subordinates (e.g., Graen and Uhl-Bien 1995) to how executive leadership influences overall organizational performance (e.g., Chatterjee and Hambrick 2007). Leadership researchers have also investigated how factors in a situation influence leaders' actions and effectiveness (Podsakoff et al. 1995). Given the breadth of leadership research, even a cursory review of it is well beyond the scope of this entry; however, comprehensive reviews of the field have outlined the various theoretical approaches to leadership and summarized important empirical work (e.g., Avolio et al. 2009; Bass and Bass 2008; Yukl and Van Fleet 1992).

Despite the role of executive leaders in shaping an organization's strategy, making investment decisions and acquiring or divesting product lines, some have argued, provocatively, that leaders do not fundamentally affect organizational performance. One version of this argument is that leadership is a purely perceptual phenomenon meant to satisfy people's need to believe that individuals can control at least some part of their world (e.g., Boeker 1992; Calder 1977; Meindl et al. 1985). Thus, people may attribute an organization's success or failure to a leader, even though the outcomes may be due to circumstance or chance. Another version of this argument is that organizations are tightly constrained by the environment and influenced by circumstances that cannot be controlled (Hannan and Freeman 1984; Podolny et al. 2005), and, accordingly, executives will have very limited choice in their actions, or those actions will have limited impact on their organizations' performance. Arguments questioning the importance of leadership persist, even though the evidence is equivocal.

Perhaps the best explanation for why leadership is sometimes viewed as inconsequential is that the circumstances under which leaders are likely to influence performance and the mechanisms through which that influence takes place are

not well understood (Hambrick et al. 2005). This observation is consistent with an emerging consensus that executive leadership is related to organizational performance but the mechanisms by which this occurs are not fully understood (e.g., Wang et al. 2011).

Recently, leadership researchers have been urged to address how leaders influence the processes within organizations that lead to performance outcomes (e.g., Avolio et al. 2009). In this entry, we focus on how senior leaders exert their most pervasive influence – over their organization's culture – and affect members' shared expectations and behavioural patterns. We suggest that this is how leaders affect their organization's strategic performance. We also suggest that the very ▶ power and authority that senior organizational leaders attain by virtue of their position in the organization's hierarchy (e.g., CEOs) simultaneously subjects them to biases that can reduce their positive impact on organizational performance.

Creating a Strong, Strategically Aligned Culture

One of the most significant ways that leaders influence their organization is by developing and managing organizational culture. Organizational culture is a set of shared cognitions or values that shape norms and expectations about which behaviours are appropriate in that setting (O'Reilly et al. 1991). Legitimate shared standards against which the appropriateness of behaviour is evaluated (Birenbaum and Sagarin 1976; Chatman 2010), or norms, influence how members perceive and interact with one another. Norms represent regular behaviour patterns that are relatively stable and expected by group members (Bettenhausen and Murnighan 1991: 21). In practice, culture functions as an informal social control system by cultivating and rewarding behaviours that are consistent with norms and sanctioning those that are inappropriate (O'Reilly and Chatman 1996). Social control shapes employees' actions, and thus affects an organization's ability to implement the strategy to which it aspires. For example, if responding quickly to market changes is competitively important, then norms such as a willingness to take risks, informal communication, and fast decision-making need to be embedded in the organization's culture. If employees internalize these norms, they will be more likely to behave in ways that accomplish strategic initiatives on their own and the organization will benefit from the efficiencies gained by a reduced need for supervision and formal coordination mechanisms (Chatman and Kennedy 2010; O'Reilly 1989).

Culture is most closely related to organizational performance when three criteria are met (Kotter and Heskett 1992). The first is that an organization's culture is strategically relevant, meaning the behaviours that are emphasized and rewarded are actually the ones necessary to accomplish pressing and relevant organizational objectives (Chatman and Cha 2003). Second, the culture is strong, meaning that people both agree about what is important and care (e.g., O'Reilly 1989). And the third criterion is that one core value focuses on innovation and adaptation and change so that the organization can sustain high levels of performance over time (Sørensen 2002).

A leader's influence on culture may be seen most directly when the organization is first formed. Schein (1985) argued that the founder plays an instrumental role in creating organizational culture by rigorously screening employees to identify those who support their ideals and values. Once employees have been selected, founders continue to socialize them into their way of thinking, and serve as a role model – embodying the values, norms and behaviours that matter to the organization – and also encouraging employees to internalize key values. This view implies that employee fit is particularly important during periods of organizational creation and change (e.g., Schneider et al. 1998), and it is during these periods that those who hold and promote the founder's values will have a greater impact on the organization than during stable periods (e.g., Pfeffer 1992). In a longitudinal study of high-technology start-up firms, Baron and Hannan (2002) showed that a founder's 'blueprint' for the organization, that is, his or her

mental model of how the organization would 'look and feel', had a pervasive and long-lasting influence over how the organization developed, who was hired and how effectively it executed its stated strategy (see also Baron et al. 2001).

Senior leaders can influence the nature of culture even in established organizations. They can set broad-based policies such as recruiting and selecting people who fit the organizational culture they are trying to create, not just from the skills they possess (Chatman 1991), provide extensive socialization to new hires and oldtimers (Morrison 2002), and ensure that the formal and informal reward systems are consistent and directly linked to the norms that are necessary for implementing organizational strategy (Chatman and Jehn 1994).

Leaders also influence culture through their actions. When people are unsure of themselves and their own judgement, or when the situation is ambiguous as is typical in organizational life (e.g., Alvesson and Sveningsson 2003), they look to and consider other people's actions, particularly those in leadership positions, to determine their own thoughts and actions (e.g., Banaji and Prentice 1994; O'Reilly and Chatman 1996). Leaders can also heighten the salience of particular information by forcefully interpreting events and behaviours and calling attention to important norms for internal and external followers (e.g., Flynn and Staw 2004; Staw et al. 1983). In this way leaders have been characterized as signal generators who embody their organization's identity (e.g., Tushman and O'Reilly 2002).

Because senior leaders' actions are visible and blurred with their organizations' identity, consistency between leaders' actions and the desired culture is critical. And, since employees are particularly vigilant about observing and interpreting leaders' behaviour, even mundane aspects of leader behaviour such as how they spend their time, the questions they ask or fail to ask, the issues they follow up on and those they drop, and the events they celebrate send messages about what is, and is not, critical for the organization (Pfeffer 1992). These signals cause members to make judgement calls and trade-offs on a moment-to-moment basis that are aligned with leader priorities, which, in the best case, are closely aligned with an organization's strategic reality. If leaders' behaviour is inconsistent with an organization's strategic aspirations, the organization is less likely to perform competitively (e.g. Hambrick et al. 2005).

But creating a strong, strategically aligned culture requires that leaders get members to agree with and care intensely about organizational objectives. Social psychologists have studied the processes through which individuals move from simply complying with norms because of the possibility of sanctions, to becoming committed to those norms (e.g., Cialdini 2007: ch. 3). In general, individuals become committed when they see the norm as consistent with their own values, feel that have freely chosen to follow the norm, and believe that their decision is visible to others and is supported by them (O'Reilly and Caldwell 1981; O'Reilly and Chatman 1986). Leaders who build commitment often do so by tying their messages to employees' perspectives, engaging members and helping them make choices that support their own desires and organization goals (Tushman and O'Reilly 2002).

Building a Leadership Team

Emerging research demonstrates that, in addition to shaping culture, leaders influence organizations by deciding whom to include in their leadership team and how consistent leaders are through the organization in their perspective on what constitutes strategic alignment (O'Reilly et al. 2010). In large organizations, it may be the aggregate influence of leaders at different hierarchical levels that determines whether strategies are implemented, thereby affecting organizational performance. While most previous studies of leadership have focused on the effectiveness of a single person (e.g., the CEO, a general manager or supervisor), the importance of alignment among leaders at different levels in an organization has long been acknowledged (Hunt 1991). For example, Berson and Avolio (2004) argue that the actions of upper-level leaders influences the ways lower-level leaders translate and disseminate information about a new strategy. Since one of the critical

ways leaders influence organizational performance is by providing a compelling direction, the lack of a clear, consistent message across levels of the leadership may provide mixed signals about the importance of an initiative and lead to a lack of focus (Cha and Edmondson 2006; Osborn et al. 2002).

But *how* aggregate leadership influences organizational performance is not straightforward. For instance, a powerful senior leader may compensate for less effective leaders at lower levels. Alternatively, a less effective but highly aligned set of leaders across levels may successfully implement change. Or an effective set of subordinate managers who do not support a strategic initiative may block change. Regardless of an individual leader's impact, the alignment or misalignment of leaders across hierarchical levels may enhance or detract from an organization's ability to successfully implement strategic initiatives. One study showed that leadership at one level compensated for or undermined the effects of leadership at another (O'Reilly et al. 2010). Said differently, the likelihood of implementing a strategic initiative may hinge critically on a senior leader's ability to build alignment among organizational leaders across hierarchical levels.

Power and Leadership

We have argued that effective leaders build strong, aligned cultures and develop a team that is committed to the organization's strategy. On the face of it, this seems to suggest that high performance will follow from picking the 'right' leader – one who has the personality and skills to cultivate a strategically relevant, strong and adaptive culture. Of course, it is not that simple. Even if one could reliably identify the characteristics of effective leaders, being a leader may affect a person in profound ways. One of the realities of modern organizations is that executive leaders have a great deal of power. Recent research in social psychology has to begun to explore what happens to an individual when they are put in a position of power. The very fact of having a high level of power can change the way a person approaches problems and deals with others, and, extrapolating to senior leader roles, this surely influences how a leader shapes the culture or builds a leadership team.

Recently, researchers have begun to develop theories and empirical evidence to understand how people change when they acquire power (see, for example, Galinsky et al. 2008; Magee et al. 2004 for reviews). When individuals acquire the ability to reward or punish others, evaluate subordinates' performance, or are assigned a dominant position in a bargaining exercise or simulation – in other words, acquire power – this changes the way they think about others and even approach problems (Magee et al. 2004). Similarly, Galinsky et al. (2008) argue that when individuals are put in positions of power, even if they are randomly assigned to the position, they become more action-oriented, goal-directed and optimistic than do those without power. In addition, people with power also become more broad and abstract in their thinking, concentrating less on details and more on the holistic aspects of a problem (Guinote 2007). All of these psychological changes have the potential to lead to positive outcomes for the organization. But others can lead to negative outcomes such as making biased or inaccurate decisions.

Being put into a position of power creates psychological changes that can drive the power-holder to take actions that can have negative consequences. When given power, people develop increased confidence in their own abilities and become more prone to take risks. They also tend to ignore the perspectives of others and to view others instrumentally, primarily as tools to accomplish a task. And, not only are they more prone to lie than are the less powerful, but attaining power also equips them with physiological tools, increases in cortisol and testosterone levels, to buffer any stress caused by lying (Carney et al. 2011).

In addition to physiological changes, another line of research explores why power changes an individual's perspective, suggesting that power reduces the perception of social constraints. That is, when people feel that they have power, they believe that the social norms and mores that shape day-to-day activities simply do not apply to them

(Keltner et al. 2003). When this happens, inhibitions are reduced and people act more in line with their dispositional tendencies. In particular, when a person is, by nature, a risk-taker the effects of power may exacerbate those tendencies.

It is not hard to imagine that the very power attained by senior executives enabling them to cultivate an effective culture also increases the likelihood of such negative outcomes – a fact made clear over the last decade in dramatic organizational and leadership scandals such as Enron and News Corp (e.g., Lyall 2011; McLean and Elkind 2003). These underscore the notion that people are inherently vulnerable to the dark side of power and recent research has made progress in identifying the physiological and psychological mechanisms. Indeed, the stereotype of the successful executive as a confident, goal-directed risk-taker fits this profile, and is seen as typical and even desirable for many executives. The important insight from this recent research is that, independent of a leader's personal characteristics, the very fact of being in a position of power makes one prone to behave in particular ways. The challenge for leaders and organizations is to channel the positive changes that arise from the experience of power into productive outcomes while simultaneously avoiding the potentially damaging possibilities.

See Also

- ▶ Charismatic Leadership
- ▶ Organizational Culture
- ▶ Power
- ▶ Top Management Teams

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Learning and Adaptation

Daniel A. Levinthal
University of Pennsylvania, The Wharton School, Philadelphia, PA, USA

Abstract

This entry discusses the process of learning and adaptation whereby organizations and agents adapt their behaviour within an ever-changing business environment. These processes are based on a mechanism of reinforcement learning, but the basis for reinforcement may vary from one's own outcome performance, the performance of other entities or the organization's beliefs about the outcomes that it experiences. Learning is a powerful basis for intelligent action and serves as a counterpoint to traditional images of rational decision-making, but is subject to important potential pathologies and challenges.

Definition Learning and adaptation is a process by which organizations and agents adapt their behaviour through the reinforcement of those processes that are perceived as 'successful' and those that are regarded as 'failures'. Through this process the organization can improve its current processes and also identify new bases of action.

Classic views of strategic management treat the subject from the perspective of a rational planning exercise, whether or not it is economically based (Porter 1980) or a quasi-engineering of intended rationality (Ansoff 1965). A long-standing counterpoint has been process-oriented views of strategy-making that emphasize the emergent nature by which strategies may come to be (Mintzberg and Waters 1985). In recent years, a distinct perspective, which emphasizes the role of learning and adaptation, has garnered considerable energy and attention. The importance of learning and adaptation has two distinct bases. One stems from the observation of bounded rationality (Simon 1955) and the depiction of firms as driven, in important respects, by rule-driven, routine behaviour patterns (Cyert and March 1963). The other basis is not a statement about individuals or organizations but focuses instead on the contexts in which they operate. Competitive environments are subject to ongoing shifts, which might be technological changes, regulatory shifts or competitor moves. Thus, the problem of strategic management is an ongoing challenge of attempting to link a firm and its potential sources of competitive advantage to an ever-changing competitive environment.

The literature addressing the topic of adaptation and learning is rich and variegated but has, at its core, the fundamental mechanism of reinforcement learning. Outcomes are observed, and actions associated with favourable outcomes are reinforced and are more likely to be evoked in the future, while actions associated with unfavourable outcomes are, accordingly, less likely to be evoked in the future. While this basic mechanism underlies a wide body of work, much of the development in the literature consists of enriching this basic structure. For instance, while the foundational work of Simon (1955) and March and Simon (1958) noted the critical distinction between outcomes that are encoded as 'successful' or 'failures', a large body of work has addressed this encoding process. Starting with Cyert and March (1963), there was a recognition that aspiration levels, that is, what constitutes the boundary between 'success' and 'failure', are themselves subject to an adaptive process. A history of successful outcomes will tend to cause the aspiration level to rise over time, while a predominance of failures will tend to lower the organization's aspiration level. Thus, organizations are not only becoming more competent at the set of practices in which they are engaged through a process of experiential learning, they are also simultaneously learning what are reasonable goals and developing beliefs regarding more or less desirable practices with which to engage (Levinthal and March 1981). This simultaneous learning process may result in a competency trap (Levinthal and March 1981; Levitt and March 1988) in which an organization has accumulated skill and expertise with a set of practices that may be inherently inferior to other possible bases of

action. However, due to the accumulated learning associated with the current practices, experimentation with potentially superior practices will yield inferior outcomes.

Aspiration levels are not only a function of one's own experience but may also reflect the observation of the performance outcomes of others (Greve 2003). Aspirations may be subject to a social learning process, yet there may also be population-level, or vicarious, learning, by which actions undertaken by successful organizations are reinforced in organizations that did not engage in these practices themselves. Of course, as with any learning process, this linkage between observed actions and outcomes may be misleading. Outcomes which are subject to substantial stochastic influences may be prone to superstitious learning (Lave and March 1975). This type of learning is most likely to occur in relatively benign environments in which positive outcomes are likely to be experienced regardless of the organization's actions. Another challenge to population-level learning processes is that a given action may have very different consequences if undertaken by an observing, rather than the focal, organization. This consideration is highlighted by work that considers the interdependence among an organization's policy choices (Levinthal 1997; Rivkin 2000). For instance, a given human resource policy may have very different consequences as a function of a firm's product strategy and manufacturing process (MacDuffie 1995). In the absence of recognizing the full set of contingencies that impact a given policy's contribution to an organization's performance, population-level learning processes may be illusory. In this regard, it is important to note that the considerable effort devoted to benchmarking performance across organizations makes the implicit assumption that the payoff associated with the focal policy under consideration is largely independent of the vast set of other actions the organization is carrying out (Levinthal 2000).

Analogical reasoning is a particular form of population-level learning in which the reinforcement process may not even stem from the organization's focal industry or current time period (Gavetti et al. 2005). In analogical reasoning, a 'solution' or business model from one context may be transported to another. For instance, the so-called category-killer business model of Toys R Us, of high variety within a given product domain, may be imported to another product domain, such as office products. Of course, as with any reinforcement learning process under uncertainty, such analogical reasoning may be misleading and actors may link the similarity of different contexts based on relatively superficial features and miss potentially important distinctions in the underlying economics in the 'source' and 'target' situation.

Models of adaptive learning have generally treated the reinforcement process as driven by observable, tangible outcomes such as a profit or loss associated with a given initiative. However, work on credit assignment (Samuel 1959; Holland 1975; Holland et al. 1986) makes the important point that the reinforcement may stem from the actor's mental model, associated with the observed state, associated with a given action. This idea starts with Samuel's (1959, 1967) early work on machine learning, in which he programmed a computer to learn to play the game of chequers. Relying on the end states of win, lose or draw was a very poor basis for learning. This ultimate outcome is the result of a long series of moves and countermoves. Can individual moves within this sequence be reinforced or is it only possible for entire, complete sequences to be subject to reinforcement? If the latter, the learning process is likely to be quite slow and relatively inefficient. To develop an effective strategy for playing chequers, the knowledge of intermediate moves, such as the establishing of a position in the centre of the board, is important. More generally, moves that do not in themselves lead to a positive outcome but lead to other moves that may result in a positive payoff need to be reinforced. The credit assignment algorithm developed by Samuel and built upon by Holland (1975) and Sutton and Barto (1998) does exactly that, with actions that lead to a given state being 'rewarded' or reinforced as a function of the perceived value of these resultant states. In practice, we see the frequent use of milestones and intermediate

subgoals, and often the allocation of individual compensation and organizational resources based on the achievement or non-achievement of these subgoals. As with the theoretical mechanism of credit assignment, these subgoals need not be associated with tangible market outcomes, but may merely reflect the organization's beliefs about what constitutes a more or less favourable path. Denrell et al.,(2004) show how a process of credit assignment can lead to a path-dependent development of routine behaviour.

In a series of entry, Denrell (Denrell and March 2001; Denrell 2003) has shown the importance of the endogenous nature of sampling for processes of reinforcement learning. Borrowing from Mark Twain, Denrell and March (2001) note the 'hot stove' effect by which actions associated with distinctly negative outcomes (such as a cat jumping onto a hot stove) are not likely to be repeated. However, to the extent that outcomes have a stochastic element or the outcome might be overly generalized (not all stoves are hot), inferences may be misleading, given that future actions will be directed by these possibly misleading beliefs and, as a result, counterevidence is unlikely to be generated. Thus, false negatives are likely to be enduring in the context of endogenous experience sampling. In contrast, false positives will tend to be corrected as these (false) positive beliefs will prompt the associated actions to be sampled again, and this future sampling of experience should tend to drive beliefs closer to the actual value of the given action.

The fundamental problem of strategic management, as suggested above, is to pursue and attempt to maintain a competitive advantage in a changing environment. Within the framework of models of adaptation and learning, the dual challenge is well captured by the exploration/exploitation trade-off (Holland 1975; March 1991). Organizations, in order to survive in the present, must exploit their current bases of competitive advantage, but at the same time explore alternative bases of action in order to be viable in future periods (Levinthal and March 1993). As Levinthal and March (1993) argue, processes of reinforcement learning are likely to favour more exploitative behaviour as the rewards to such behaviour are closer in time and more proximate to the antecedent action than more exploratory behaviour. Benner and Tushman's (2002) work on the impact of the adoption of process improvements provides strong evidence of such a bias. There has been a rich literature on the different mechanisms associated with exploratory behaviour, recognizing that actions may be exploratory with respect to the technologies with which the firm is familiar (Rosenkopf and Nerkar 2001) and the mechanisms by which an organization might engage in search behaviour (Lavie and Rosenkopf 2006). The general argument in the appreciative literature considering the exploration/exploitation trade-off suggests that, from a normative point of view, the desired level of exploratory behaviour increases with the rate of environmental change. However, Posen and Levinthal (2012) point out that environmental change has a dual effect. On the one hand, as conventional wisdom emphasizes, environmental change renders prior knowledge partially obsolete and therefore suggests that under such conditions there should be a greater emphasis placed on exploratory search. However, if environmental change is an ongoing part of the competitive landscape, then greater rates of change also reduce the payoff to any current investment in learning. Therefore, in general the net effect of environmental change on the desired balance is ambiguous. In the analysis of a bandit model of exploration/exploitation, Posen and Levinthal (2012) find that under high rates of change the net effect of greater rates of change is to make more exploitative behaviour more desirable. In this light, it is also important to distinguish between exploration as a behaviour versus exploration as a strategy (Posen and Levinthal 2012). High rates of environmental change will tend to reduce the proclivity to engage in current behaviours, even for a fixed strategy of exploration/exploitation.

Learning processes tend to be path-dependent. This was previously noted in the context of the concept of a competency trap in which acquired capabilities with respect to a particular strategy will tend to render alternative strategies less attractive. Further, to the extent that search processes are local, learning processes will tend to be

path-dependent. In particular, if there are interdependencies in the returns to enacting one or more policy changes, the payoff surface associated to policy choices will tend to be 'rugged' (Levinthal 1997). Local search in a rugged fitness landscape will lead to a local peak, a setting in which incremental moves in the policy space will not increase performance. However, the particular local peak that the organization arrives at and its relative performance level will be a function of the starting point of the search process in the fitness landscape (Levinthal 1997). Christensen's provocative finding regarding the reluctance of established disk-drive producers to pursue (explore) alternative disk-drive technologies can be interpreted in this light. The established firms responded to the feedback from their existing customers. Thus, while they were willing to invest in non-local technological solutions if they met the needs of their established customers, they were unwilling to engage in searches that were not local to these customers, or members of their value net (Christensen and Rosenbloom 1995).

In sum, the dynamics of learning and adaptation are arguably central to understanding the coupling (both when loose and when tight) between a firm's set of capabilities and the competitive context in which they operate. While prior decades have provided important insights in this regard, there is considerable promise and opportunity for further progress in future decades.

See Also

- ▶ Adaptive Aspirations
- ▶ Behavioural Strategy
- ▶ Learning and Organizational Failures
- ▶ Organizational Learning
- ▶ Strategic Management of Knowledge

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Learning and Organizational Failures

Mie Augier[1] and Dijana Tiplic[2]
[1]GSBPP, Naval Postgraduate School, Monterey, CA, USA
[2]Scandinavian Consortium for Organizational Research, Stanford, CA, USA

Abstract

Failures are persistent phenomena in human history and are central to organizational ▶ innovation and adaptation. Yet there has been little systematic study on the process of learning from failure; at least partly due to unwillingness to recognize failure as failure. Another reason is a tendency to assign blame to individuals. A better understanding of the mechanisms and consequences of failure may give better understanding of essential organizational phenomena such as strategy, innovation, creativity, experimentation and adaptation.

Definition Failure is an important factor for learning. Literature treats failure in two ways. On one hand, failure is seen as a selection device that produces the adaptation of a population of organizations. On the other hand, failure is seen as an outcome from which an organization learns.

Introduction

Failures are persistent phenomena in human history and are central to organizational ▶ innovation and adaptation. Organizational failures are central to issues such as organizational innovation, strategy-making, creativity, experimentation and other aspects of organizational behaviour and theory. Yet there has been little systematic study on the process of learning from failure, as well as failures to learn and the biases and mechanisms involved. This is so because of a complex set of intertwined reasons, such as unwillingness to admit or see failure in the first place (which prohibits learning from failure); a tendency to assign blame to individuals (rather than seeing failures as organizational phenomena); undersampling of failures and complications of learning from small samples; biases towards remembering successes and so on. Given that failures are inevitable features of organizational behaviour and strategy, there are good reasons to spend more time learning from them, including understanding their organizational nature and why we tend to neglect them in the first place, in the context of both business and other organizations. Indeed, military organizations might be particularly useful for scholars of business organizations, given their complex adaptive nature (Cohen and Gooch 1990).

Why are failures important? Organizations learn from experience, converting the lessons of their own successes and failures, as well as the successes and failures of others, into practices, procedures and forms that guide subsequent actions. The mechanisms involved in responding to experience include both the differential replication of success and the generation of causal interpretations of the relation between actions and observed outcomes (March et al.1991; Winter and Szulanski 2001; Zollo and Winter 2002).

The possibilities for improvement through such mechanisms are well known, as are their

difficulties and complications (Sitkin 1992; Cohen and Levinthal 1994; Ingram and Baum 1997b; Haunschild and Sullivan 2002; Denrell 2003). In particular, it is clear that reducing the replication rate of actions associated with past failures risks premature abandonment of good alternatives (Sitkin 1992; Miner et al. 1999), while establishing the causes of experience is vulnerable to numerous errors introduced by human habits of constructing stories and in the inadequacies of the data generated by experience (Ellis et al. 2006; Kim and Miner 2007). Some of these complications stem from features of human sense-making that are potentially correctable; others stem from inherent properties of experience. Although there is ample evidence that organizations improve the effectiveness of technologies used repetitively in similar situations (Cohen and Levinthal 1994), learning from experience is filled with difficulties and errors, especially in the cases of small samples (March et al.1991; Zollo and Winter 2002).

Research on Learning from Failure

There is an extensive literature on organizational adaptation (e.g., Cyert and March 1963; Baum and Ingram 1998; Haunschild and Sullivan 2002) that implicates failure as a factor in learning (see entry on adaptation). There are two major streams in this literature. One set of studies tends to see failure as a *selection device* that produces the adaptation of a population of organizations. Another set of studies tends to see failure as an *outcome* from which an organization learns. The former pictures adaptation as resulting from the differential survival of organizations more fitted to the environment; the latter pictures adaptation as resulting from differential replication of successes (rather than failures) and from the derivation of a causal understanding of the environment due to the observation of successes and failures.

In both cases, learning is typically associated with the amount of experience, which is measured either by time or by units of output produced. The characteristic assumption is that experience includes instances of success and instances of failure, and that learning results from contemplating the association between such outcomes and actions taken. In most cases, the particular problems of learning from failure (as distinct from learning from success) are not identified.

Variation/Selection Perspectives

Studies using a variation/selection framework portray differences in organizational failure rates as one of two primary mechanisms (the other being reproduction) that determine changes in a population of organizations. Within such a framework, it is assumed that failure reflects (or defines) inadequate fitness to the environment, and that changes in the rate of organizational failure in a population result in changes in the organizational replacement rate. Adaptation occurs through the elimination of less fit organizations. Learning is defined as an improvement in survival prospects (Baum and Ingram 1998).

Students of organizational adaptation using a variation/selection frame have studied organizational failures in numerous industries, including the automobile industry (Hannan 1997), newspapers (Carroll and Delacroix 1982), breweries (Barnett 1997; Carroll and Swaminathan 2000), the bank sector (Barnett and Hansen 1996), the hotel industry (Baum and Mezias 1992; Ingram and Baum 1997a, 1997b) and telephone companies (Barnett 1997).

It has been found that organizations are less likely to fail if they have more competitive experience (Barnett and Hansen 1996), and that survival has a U-shaped relation to the density of organizations within a niche (Hannan and Carroll 1992). Among small organizations, selection favours strong competitors (Barnett 1997) (strength has been defined based on two dimensions: individually viable organizations and ecologically potent organizations). However, even though organizations initially benefit from their own experience, they can be harmed by it in the long run (Ingram and Baum 1997a). In the context of the hotel industry, it has been shown that organizational experience has a U-shaped effect on failure (Baum and Ingram 1998).

Studies that have investigated the effect of the industry's experience on individual organizational

performance have found that organizations benefit from both their industry's experience (Ingram and Baum 1997a) and an organizational form's (e.g., hotel chain) experience (Ingram and Baum 1997b).

Organizational Learning Perspectives

Studies of adaptation using a learning framework assume that failure drives adaptive change through encouraging search, cognitive understandings, and the resultant modification of organizational routines (Cyert and March 1963; Levinthal and March 1981; March 2010). Failure experiences are important for firm strategy too, both because failure events provide information about organizational problems and because increases in the failure rate increase experimentation in organizations (Levitt and March 1988). The process fails to lead to improvement when routines do not change or change in a dysfunctional way.

Experience with dramatic failure has been studied within the context of disasters and crises. In his analysis of the Tenerife air disaster, Weick (1990) examined how the vulnerability of a system to crisis events created a situation in which multiple small errors occurred and became interdependent, which resulted in a multiplication of their effects. The system failed to understand the mechanisms adequately, and consequently failed to learn from the disaster. The Mann Gulch disaster (Weick 1993) provides another illustration. In situations characterized by an erosion of sense and structure, there is a need for reestablishment of a role system. Madsen (2009) compared mechanisms for learning from disasters and those from minor accidents. His data included accidents in the US mining industry for the period 1983–2006. He argues that organizations learn to prevent future disasters primarily through direct and vicarious experience with them.

In general, the replication of actions associated with success is an effective base for organizational adaptation, for example, through repetitive practice, which includes cases of success and cases of failure, with a declining incidence of the latter (Argote et al.1990). In addition, the proposition that firms learn from errors has been tested by examining the effects of accidents in specific industries, such as the US railway (Baum and Dahlin 2007) or US-based commercial airlines (Haunschild and Sullivan 2002). It has been shown that the costs due to accidents decrease with increases in operating experience (Baum and Dahlin 2007). Further, it has been shown that heterogeneous errors (i.e., errors that have multiple causes, unlike homogenous errors that have simple causes such as a human factor) are better for learning (Haunschild and Sullivan 2002).

In the context of acquisitions that took place among US-based publicly held companies, Haunschild and Miner (1997) have documented that vicarious learning from success and failure is asymmetrical, meaning that acquirers not only imitated firms with good outcomes but also firms with bad outcomes. Empirical evidence from US commercial banks (Kim et al. 2009) shows that a firm's survival chances increase with increased experience with failure, but only after a certain level of experience has been acquired.

Adaptation based on practice is compromised by the way in which the replication of success results in a biased sampling of experience. Replication of success leads to sampling the consequences of actions that have led to success more often than the consequences of actions that have led to failure, thus to substantially less reliable understandings of failure than of success. This under-sampling of failure and oversampling of success has been identified as one of the key features of learning (March 2010). In particular, under-sampling of failure has been shown to have important implications for business performance (Denrell 2003) and risk-taking behaviour (March and Shapira 1987; Denrell and March 2001).

Recent empirical studies on learning from failed experiences are found in US radio stations (Greve 1998), Ontario nursing homes (Chuang and Baum 2003), and Tokyo and Osaka shipbuilders (Audia and Greve 2006). Failure is treated as a poor performance – that is, performance below an aspiration level (Greve 1998; Chuang and Baum 2003; Audia and Greve 2006). Responses to failure are seen in changes in risk-taking behaviour, but these studies provide

few indications of significant learning from the experience of failure. A study of published studies of 50 failures and near-failures in 28 industry histories (Miner et al. 1999) found that organizational failures may sometimes have an impact on inter-organizational population-level learning; but the impacts are not reliably beneficial for the population.

Sitkin (1992: 243) identified five key characteristics that might contribute to the effective learning from failures: (1) thoughtfully planned actions; (2) uncertain outcomes; (3) modest scale; (4) short response time of the environment; and (5) familiar domains. He also (p. 246) argued that organizations can facilitate learning from failure by focusing on processes rather than outcomes, by making failure legitimate, and by emphasizing the involvement of management systems in organizational failures, rather than focusing on individual errors.

Closing Thoughts

Failures are important features of organizational behaviour. The emerging literature around understanding failures and learning from them is important in recognizing the role of failure in firm strategy and strategic decision-making, since strategic endeavours often represent mixes of failures and successes over time. Consider a situation in which a firm seeks to increase its performance. Without taking into consideration the role of failure, the firm will tend to switch among various strategies to increase performance. Such behaviour is well documented in strategic literature (i.e., quick adaption between an organization and its environment to achieve strategic fit). However, it is a balance between failures and successes that may be the most beneficial for a firm. For example, most new ideas do not lead to success or innovation; yet firms have to persist trying new ideas in order to get to the ones that might lead to innovation over time. In that way, innovation results after a series of failures. Willingness to persist trying new things in the face of failure as well as willingness to recognize and learn from failures is central. Thus, a better understanding of the mechanisms and consequences of failure may give a better understanding of essential organizational phenomena such as strategy, innovation, creativity, experimentation and adaptation.

See Also

- ▶ Innovation
- ▶ Organizational Learning

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Lens Model

Ulrik William Nash
University of Southern Denmark, Odense, Denmark

Abstract

Firms consist of people who make decisions to achieve goals. How do these people develop the expectations which underpin the choices they make? The lens model provides one answer to this question. It was developed by cognitive psychologist (Brunswik, Egon. *The conceptual framework of psychology*. Chicago: University of Chicago Press, 1952) to illustrate his theory of probabilistic functionalism, and concerns the environment and the mind, and adaptation by the latter to the former. This entry is about the lens model, and probabilistic functionalism more broadly. Focus will mostly be on firms and their employees, but, to fully appreciate the scope, we have to keep in mind the fact that probabilistic functionalism extends to all purposive organisms. Probabilistic functionalism is currently experiencing growing interest among strategy scholars, and some very recent papers are highlighted in conclusion.

Definition The lens model is an illustration developed by cognitive psychologist Egon Brunswik to clarify his theory of probabilistic functionalism. It must be discerned from the lens model equation (Tucker 1964), which is the most common quantitative formulation.

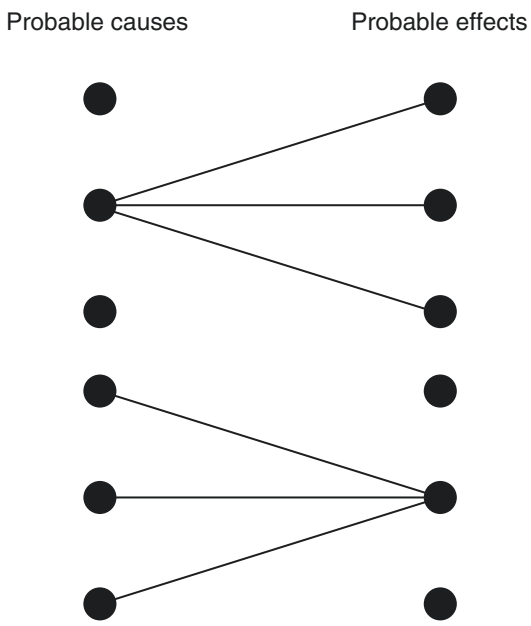
Probabilistic Functionalism and the Environment

Firms behave with intention. They take action to realize goals, or, in the terminology of cognitive psychologists, they choose means to realize ends. Indeed, within firms, actions and goals are everywhere. Construction workers make hand signals to crane operators because they want hooks moved up or down, coffee is brewed to sharpen minds, switches are flicked with the intention of brightening rooms, and major investments in physical capital are approved to increase productivity. At every level of the firm, throughout any working day, employees connect means to ends.

Means and ends, however, seldom connect in isolation. Instead, such causal fibres join to create causal threads, with ends becoming means to further ends (Tolman and Brunswik 1935; Simon 1947). For instance, one thread woven at high levels of authority might involve talented scientists being employed to secure human capital in basic research, basic research being conducted to generate new inventions, new inventions being leveraged to innovation, innovations being produced, and products finally being sold to increase financial performance.

Another thread woven from below and working on a shorter temporal scale might involve guards authenticating the entrance of junior HR employees, junior HR employees screening applications for their senior HR colleagues, senior HR employees testing selected candidates, and talented scientists being endorsed by chief scientists, at which point the causal thread intersects with the one described above. In this way, causal fibres connect to create causal threads, which traverse to create causal weaving, which ultimately defines causal textures (Tolman and Brunswik 1935) of organizational environments and beyond. This interweaving of causality, which emerges from each moment of choice, and which determines behaviour over longer temporal scales, may be called strategy (Simon 1947). Related to this causal texture are expectations about it.

Actual and imagined causal textures rarely correspond, and, from the perspective of probabilistic functionalism (Tolman and Brunswik 1935; Brunswik 1943, 1952, 1957), equivocality in actual causal fibres may partially explain this. More specifically, according to Tolman and Brunswik (1935), any particular type of effect will, on different occasions and in different places, have different causes, just as any particular type of cause will operate on different occasions and in different places to produce various effects. In other words, the character of actual causal fibre resembles the fanning out of reasonable causes for high probability effect, and the fanning out of reasonable effects from high probability cause, which Shannon and Weaver (1948) would later describe mathematically (Brunswik 1952) (Fig. 1).



Lens Model, Fig. 1 Fanning out of cause and effect

Perceptual limitation of measurement is the other reason why actual and imagined causal textures rarely correspond.

Probabilistic Functionalism and Perception

The perceptual side of probabilistic functionalism has three basic premises. First, purposive behaviour requires the evaluation of causal textures for

direction. Second, perception is limited and causal textures may therefore extend beyond direct measurement by the purposive organism. Third, perceptible regions of causal texture may correlate with imperceptible regions, so that measurement can be attempted nevertheless, albeit indirectly and with intrinsic imperfection (Brunswik 1943). In the terminology of Brunswik (1952, 1957), causal textures contain proximal cues for distal objects, where 'proximal' and 'distal' relate to the organism's perceptual apparatus.

Within the causal texture of organizational environments, the process of hiring workers provides an excellent example of indirect measurement. Workers with higher rates of absence tend to cost employers more during employment, which creates an incentive for companies to reject applicants with this disposition. However, rates of absence cannot be measured until absence begins to occur, which, by definition, happens after contracts are entered into and work is supposed to begin. In other words, the causal interweaving associated with hiring workers appears highly ambiguous, because the presence or absence of this probable effect cannot be determined before hiring.

It turns out, however, that better-educated workers have smaller propensities for absence (Ng and Feldman 2009), and because education levels are observable from disclosed certificates, companies can use education level (a proximinal cue) to form expectations about how often the particular applicant will stay away (a distal object), which subsequently permits the formation of more accurate expectations about the broader causal interweaving that generates productivity (another more distant object). Indeed, there is good reason to believe companies make use of this opportunity. Evidence suggests that higher wages flow to better-educated workers, not only because education directly affects productivity but because highly educated workers have unobservable qualities that also affect their output (Weiss 1995). Nevertheless, events may surprise.

Not all people with low education will have a disposition to stay away from work at rates higher than normal, and not all highly educated workers will show the dedication companies expect. Evidence suggests that subordinate absenteeism is also affected by the observed absence of superiors (Kristensen et al. 2006), and failure to utilize this proximinal cue, for whatever reason, therefore has the potential to affect the accuracy of expectations and consequently reduce performance. Moreover, the degree of statistical association between education and absenteeism might only be small, effectively spoiling any hope the HR employee might have about perfect screening based on education alone.

Indeed, one of the key notions of probabilistic functionalism is that purposive behaviour is inevitably based on hypothesis (Tolman and Brunswik 1935; Brunswik 1943), an idea that was originally Krechevsky's (1932) and was later articulated by Popper (1999). How these hypotheses obtain enough support to allow the existence of employees in their jobs, of firms in their industries and, in general, of organisms in their ecologies, becomes the crucial question.

Probabilistic Functionalism and Adaptation of the Mind to the Environment

The uncertainty deriving from limited perception of equivocal causal textures creates an essential problem of survival. How do purposive organisms function when their ecology is probabilistic and uncertainty is aggravated by their perceptual limitations? According to Brunswik (1943, 1952), purposive organisms rise to this challenge by meeting chaos with compensatory cognitive flexibility, to establish stable, better-than-chance relationships with their ecology, or alternatively to form expectations that are consistently more accurate than random judgements. Brunswik (1952) measured organismic achievement by this stability, and invented the lens model to clarify how such stability arises, or, alternatively, how minds adjust and adapt to ecologies.

The lens model has numerous components placed within two modules, these modules being the probabilistic environment on the one hand, and the purposive organism on the other. Regarding the environment, while the actual environment

contains countless distal objects, for simplicity the modelled environment contains only one.

For instance, consider an entrepreneur looking to purchase an old delivery van, and suppose the distal object is miles remaining before scrapping. Since this value is caused by interweaving forces and events spanning into the future, and spanning into inaccessible areas of the van, there is no way the entrepreneur can measure directly. However, there might be numerous aspects of the causal texture that are observable before purchase, and which can be used to measure nonetheless. Some may be observable directly from the van, such as engine noise, upholstery appearance and rustiness, while others might be observable from the salesman's demeanour, which could be influenced by his expectation about miles remaining.

Although the entrepreneur can make inferences about the delivery van based on this information, there are numerous challenges. First, not all proximinal cues may be available for the entrepreneur at the moment of evaluation. For instance, unless the engine is actually started, the proximinal cue of engine sound cannot be utilized. Second, even when all proximinal cues are available, their correlation with miles remaining must be recognized by the entrepreneur, and finally, even when the entrepreneur recognizes that correlations exist, the degree of correlation perceived might be imprecise. By successfully meeting these challenges, the entrepreneur will increase the consistency of accurate judgements and reach higher achievement.

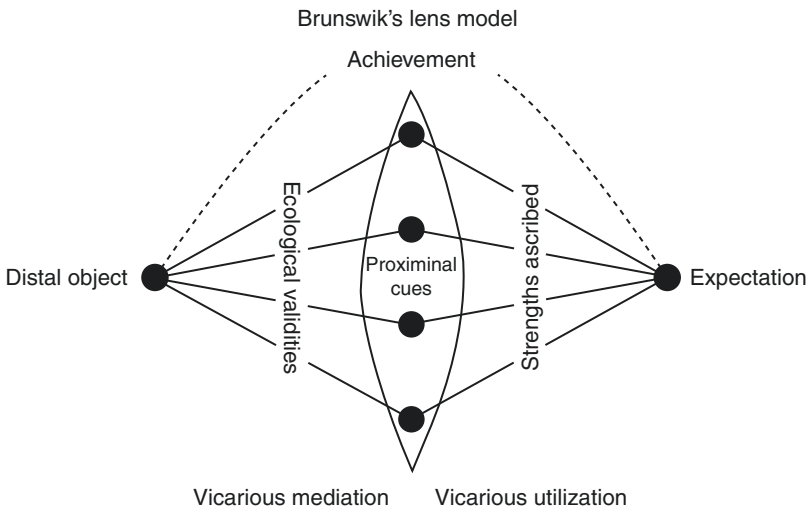
The first challenge, the challenge posed by what Brunswik (1957) called vicarious mediation by the environment, must be addressed by compensatory flexibility through vicarious utilization of proximinal cues. In other words, when one or more proximinal cues are unavailable, the entrepreneur must have the capacity to utilize substitutes. This presumes the ability to recognize these, which eliminates the second challenge.

As for the final challenge, the consistency of accurate judgements will increase until the importance ascribed to different proximinal cues equals the statistical association between these and the distal object, or, alternatively, when the importance ascribed to various proximinal cues aligns with their ecological validity.

Brunswik's lens model, with its characteristic fanning out of proximinal cues from the distal object, the focusing lens of the organism and the final expectation, is shown in Fig. 2.

Recent Work in Strategy Inspired by Brunswik

Brunswik's work on probabilistic functionalism dates back more than 50 years, but is currently



Lens Model, Fig. 2 Brunswik's lens model, with its characteristic fanning out of proximinal cues from the distal object, the focusing lens of the organism and the final expectation

being revived by strategy scholars. Given the psychological foundations of Herbert Simon's early work (Simon 1947; March and Simon 1958), perhaps the most curious thing about this resurgence is the timing. After all, the psychological foundations of Simon's early work were ideas on purposeful behaviour, as developed by Edward Tolman and Egon Brunswik.

Examples of recent work includes that by Hogarth and Karelaia (2011), who examine fallible judgements and excess entry, Csaszar (2013), who examines how organization structure may compensate for fallible mental representations, and Nash (2012), who introduces the correlated expectations theory of trade to provide an entirely new explanation for Bowman's paradox (Bowman 1982).

See Also

- ▶ Cognition and Strategy
- ▶ Information and Knowledge
- ▶ Learning and Adaptation

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Leveraging Foreign Subsidiaries' Skills

Marina Papanastassiou[1] and Robert Pearce[2]
[1]Middlesex University, London, UK
[2]University of Reading, School of Economics, Reading, UK

Abstract

Perhaps the most important step in the strategic evolution of multinationals in recent decades has been an increasing willingness to allow subsidiaries to generate distinctive skills and competences and then to leverage these towards wider group-level competitiveness. Seeing this as a process of *interdependent individualism* points to two key issues in the analysis of the phenomenon. First, how do such subsidiaries generate their *individualized* scopes? What are the knowledge sources drawn into their creativity? A second key

theme is to what extent and in which ways are subsidiary-level competences leveraged so as to be *interdependently* related to group-level programmes for competitive regeneration. If such subsidiaries are closely monitored in a proscriptive manner this may stifle sources of potentially rewarding diversity and consign the group to very mundane inventive potentials. But allowing them too much independence in creative initiative may provoke anarchy, with unrelated projects adding up to an incoherent agenda for future competitiveness.

Definition Leveraging foreign subsidiaries' skills and competences allows multinational enterprises (MNEs) to tap into an increasing range of knowledge bases and capabilities worldwide. Subsidiaries can internalize creative attributes from a host country national system of innovation, so as to individualize their own technologies, which can then be exercised interdependently within their group's wider regenerative processes.

Integral to the ways in which multinational enterprises (MNEs) have reconfigured their organizational structures and strategic profiles in response to changes in the global economy in recent decades has been the reformulation and deepening of the roles played by subsidiaries. Central to this has been the repositioning of subsidiaries to reflect changes in the influencing circumstances of a host economy, whether these be internal (reflecting the processes of development) or external (institutional and other changes in the global economy). Thus, in the early postwar decades the dominant subsidiary role was 'tariff-jumping' market-seeking (MS). Here a subsidiary, protected from import competition, produced a significant part of the parent company's product range exclusively for its local market. Later, with the lowering of trade barriers, and a more generalized intensification of international competition, efficiency-seeking (ES) became a more prevalent subsidiary motivation. Now the subsidiaries specialized in the export-oriented supply of a select subset of the group's products, focusing on those whose production technologies matched the host economy's current factor proportions (static comparative advantage). Here, for the first time (outside earlier resource-based operations) particular host country supply-side conditions became built into the MNE's programme for global competition.

However, in neither of these roles is the subsidiary expected to develop any distinctive in-house competences, serving instead as a routine vehicle for the dependent application of mature group-level sources of competitiveness in response to host country potentials (market or input) which it addresses in a predominantly arm's-length manner. Though both the host country market and its input availabilities will change (and affect subsidiary evolution) this happens in ways that are beyond the direct proactive commitments of such subsidiaries. But the next major change in subsidiary positioning moves beyond these dependent limitations to generate a more embedded *inter*-dependence, interrelating *dynamic* processes in the host economy and in the MNE. Now, operationalizing a motivation that can be broadly described as knowledge-seeking (KS) (Papanastassiou and Pearce 2009: 9–16; Pearce 2011), MNEs devolve to selected subsidiaries a role in innovation and their generalized pursuit of competitive renewal. They now seek to leverage towards their technological and market upgrading subsidiary-specific sources of creativity that, in turn, are expected to be internalized from (and therefore to reflect) dynamic attributes of their host economy.

The first systematically researched and carefully analysed manifestation of such subsidiary-level development was the World Product Mandate (WPM) detected amongst (mainly) US MNEs' operations in Canada (Poynter and Rugman 1982; Rugman 1983; D'Cruz 1986; Rugman and Douglas 1986). Rugman and Douglas (1986: 92) assert that 'a WPM should be defined as the full development, production and marketing of a new product line in a subsidiary of an MNE', so that (Poynter and Rugman 1982: 60) 'a full world product mandate … carries out research and development, strategic management, production and international marketing functions for the product either worldwide or possibly for a

geographic area'. The pioneering case studies of these WPMs in Canada (Rugman and Bennett 1982: 60–61; McGuiness and Conway 1986: 147–156) suggested that the origins of these early examples tended to be rather ad hoc and sui generis, but also that, once initiated, some of them, at least, were able to build on the competences and intra-group reputation so as to secure an extension and deepening of such evolutionary responsibilities. Thus, at this stage, devolving of WPM-type creativity to subsidiaries was not yet a systematic practice amongst MNEs. Indeed, a vital conditioning feature of the Canadian context conducive to WPMs was a proactively supportive government policy, notably including a willingness to subsidize R&D, which thereby sought to draw the technological potentials of MNEs' operations into overcoming a perceived national weakness. This means that, by contrast with later comprehension of subsidiary-level creativity, the genesis of the WPM concept in Canada did not reflect a desire to draw in and build on specific knowledge-based assets and skills of the host economy but was, rather, a host country attempt to alleviate *weakness* in this regard. Nevertheless, these studies did provide a provocative articulation of a potential subsidiary capability that soon pervaded the literature.

Another important step in understanding the positioning of such development-oriented subsidiaries, again generated from the Canadian context, was the first broadly based typology of their roles or motivations (White and Poynter 1984). This categorizes subsidiaries along three dimensions of scope. First, product scope, which covers the extent of the group's current product range that a subsidiary supplies but also discerns the latitude it has for 'product line extensions and new product areas' (White and Poynter 1984: 59). Then, market scope reflects the markets accessible to the subsidiary (purely domestic or export). Finally, value-added (or functional) scope relates to the range of activities the subsidiary needs to operationalize to fulfil its role. Of seven roles White and Poynter discern within their scope typology two have a product scope that targets the development of new goods with, therefore, a necessarily wide functional scope and expectation of an international market scope. Here the *product specialists* 'stay within product areas related to the core business of the multinational parent' and thus work from basic technologies close to those of the parent. But, as White and Poynter suggest (1984: 60–61), with limited exchanges between the subsidiary and its parent, the product specialist has strategic control over its products and general self-sufficiency in applied R&D, production and marketing. By contrast, the *strategic independents* 'pursue opportunities in unrelated product areas by way of either internal development or acquisition opportunities'. The subsidiary's relations with the parent may be more strictly limited to administrative and financial issues (White and Poynter 1984: 60–61).

We can now see that White and Poynter's distinction between product specialists and strategic independents, albeit a rather speculative one at the time it was offered, in fact pointed towards three interrelated issues that become central to aspects of the later investigation of subsidiary-level creativity. First, how far should a subsidiary's developmental projects be allowed to deviate from the trajectory indicated by the group's technological and product norms? Too much leeway in this respect might allow a subsidiary to pursue radical options which break from established group capacities and ultimately flounder due to an inability to access knowledge needed to complete its project or co-opt meaningful support from its parent network. But too little autonomy with regard to such speculative scope might stifle potentially important original paths to a group's competitive expansion. Secondly, how much should an HQ monitor and mediate the content and progress of its developmental subsidiaries? Here again, imposition of a centrally determined constraining conformity may waste distinctive subsidiary-driven potentials that could propel the group's progress into major new fields. But lack of systematic overview could result in too many unconsidered subsidiary projects, with no links to the company's tradition or to each other, with this leading to developmental anarchy and destructive incoherence. Thirdly, what are the dominant knowledge sources through which these subsidiaries can individualize their

innovative potentials? Are they mainly limited to imposing localized ideas onto a technological platform that still reflects the established strength of the group? Or can they draw in much more idiosyncratic external perspectives that are less conditioned by mature parent expectations?

The process of positioning the insights on the strategic/creative potentials of subsidiaries into the wider evolution of increasingly diverse MNE organizations then benefited considerably from the research and analysis of Bartlett and Ghoshal. Within this extensive contribution we can here review two strands that reflect on the emerging capacity to leverage distinctive subsidiary capacities towards wider group progress. First, a 1986 *Harvard Business Review* article that precisely advised MNEs to tap your subsidiaries for global reach indicates the way in which diverse subsidiary environments can selectively draw strategic influence away from a traditional centralized hegemony. Here, a four-quadrant subsidiary typology is generated. The first axis for this indicates that the 'strategic importance of a specific country unit is strongly influenced by the significance of its national environment to the company's global strategy' (Bartlett and Ghoshal 1986: 90), with this extending beyond the market to encompass its level of technological and creative sophistication. This allowance for a more systemic consideration of host country potentials immediately moves the analysis beyond the ad hoc, and perhaps opportunistic, scenario of the Canadian cases. The second axis then relates to the existing competences of the subsidiary itself, covering its capacities in technology, production, marketing and management.

Here, Bartlett and Ghoshal define a *strategic leader* as operating with a high level of in-house competence in a location with a high strategic importance, so that it 'serves as a partner of headquarters in developing and implementing strategy' (Bartlett and Ghoshal 1986: 90). The strategic leader would aim to detect important indicators of change in its local environment and possess the resources to generate an appropriate response that enhances the competitive horizons of the parent group. The *contributor* then occupies the quadrant of high subsidiary capabilities in an environment that does not itself possess immediate strategic importance. Bartlett and Ghoshal suggest that with limited local impetus towards the application of these attributes the group should still nourish them and leverage them into other projects of corporate relevance. The typology then also defines a problematic *black hole* where a subsidiary of limited competence operates in a market of high strategic importance and the *implementor* with restricted competence in a market which is of limited strategic relevance. The latter may, however, be vital, in an efficiency-seeking way, in realizing the group's current competitiveness as they provide 'the opportunity to capture economies of scale and scope that are crucial to most company's global strategies' (Bartlett and Ghoshal 1986: 91).

The second facet of Bartlett and Ghoshal's analysis relevant here distinguishes two approaches to innovation that were logical within the confines of their *transnational* organizational structure. The transnational itself, they noted, was emerging in a competitive situation where 'the forces of global integration, local differentiation, and world-wide innovation had all become strong and compelling' (Bartlett and Ghoshal 1989: 16). From this context the transnational approaches to innovation would seek to proactively draw into new aspects of global competitiveness influential *differences* in international environments; notably, diversity of consumer tastes, market trends, new technological possibilities and government requirements. Here, the *locally leveraged* approach would address a fully integrated innovation process with the aim of exploitability on a global basis. Doing this from in-house capabilities drawn from the host economy and reflecting elements of its characteristics (for example, market perceptions) is a potential for the strategic leader. The more radical *globally linked* approach draws on separate and specialized resources and capabilities (R&D; market research; engineering) from different parts of the group to achieve an innovation for, again, group-wide exploitation. Providing a particular component to such an integrated cross-border innovation could then be a role for a contributor subsidiary.

The process of leveraging subsidiary-level skills and competences to support group-level competitiveness can be articulated as one of inculcating a culture of *interdependent individualism* (Papanastassiou and Pearce 1998, 1999, 2009). In this, a subsidiary generates unique individualized skills or competences, with the understanding that these may then be drawn into support of wider group-level competitive evolution. Here, the overarching aim would be to allow for 'extensive decentralized originality that remains open to centralized monitoring and evaluation . . . to ensure that it supports the enrichment and coherent evolution of a clearly articulated group-level' developmental trajectory (Papanastassiou and Pearce 1998: 54). Thus the first need is for the subsidiary to generate individualized competences from its host country knowledge base, which can only be achieved effectively where the subsidiary is allowed 'to exercise very considerable degrees of creative autonomy', but without this resulting in any dangerous degree of isolationism. However, the ability of the subsidiary to fully comprehend the value of local knowledge to which it may be able to secure access and then 'to internalise and operationalise it effectively is likely to derive from what [it] already knows', which is essentially its base in its MNE group's existing technological capacities (Papanastassiou and Pearce 2009: 11–12). Indeed, whereas the subsidiary may develop its own knowledge potential most valuably in conjunction with extant group technologies, these 'elements of new subsidiary-level knowledge may not only support its own product development ambitions but also have the potential to enrich the technological scope of other subsidiaries that are working on other parts of the group's product range' (Papanastassiou and Pearce 1998: 53–54). The projection of individualized subsidiary competences needs to be understood and exercised interdependently within a wider group developmental consciousness. Or, in the terms of Rugman and Verbeke (2001), the basic nature of really valuable subsidiary-specific advantage is to be *non*-location bound.

The requirement that development-oriented subsidiaries should be able to individualize their own competences so as to establish a uniquely assertive position in the group, but do so in ways that remain coherent and interdependent with its overall evolutionary scopes and objectives, suggests 'that they do so . . . by deriving distinctive perspectives from positions in two technological communities. The first of these is that of the MNE group itself, while the second is the scientific heritage and research base of the host country' (Papanastassiou and Pearce 1998: 73). The ability of the group's HQ to secure an appropriate balance between these communities, generating *and* leveraging relevant skills and capacities, lies at the centre of issues raised by such subsidiaries and outlined earlier here. Where the group's knowledge base still dominates, the local inputs internalized by the subsidiary 'may strengthen [its] scope in valuable ways that nevertheless remain securely anchored in the mainstream technology of the group'. The contribution is mainly evolutionary, enhancing the application of core technology and not challenging the 'coherence and balance in group operations', but not underwriting any new potentials for longer-term progress. But where the impetus to individualism derives mainly from more radical perceptions of local knowledge sources there is bigger potential to substantially reinforce the group's longer-term technological development but also to generate 'a greater danger in terms of loss of control over key areas of knowledge evolution' (Papanastassiou and Pearce 1998: 73). The implications and activation of the multiple embeddedness of such creative subsidiaries, and their drawing of individualized sources of knowledge dynamism from their host environments, have been the subject of a considerable range of valuable research contributions (for example, Andersson and Forsgren 2000; Andersson et al. 2001, 2002; Frost 2001; Frost et al. 2002; Cantwell and Mudambi 2005, 2011; Yamin 2005; Yamin and Andersson 2011).

A further step in the progression of these lines of analysis was to argue that the ability of subsidiaries to generate leverageable skills and competences, and then determine *how* these *were* leveraged towards group-level competitiveness, would depend on the sources of technology drawn on and assimilated by these subsidiaries.

This was then, in turn, related to the roles played by the subsidiaries in their group's diversified global networks (Papanastassiou and Pearce 1997, 1999; Manea and Pearce 2004: 28–51; Manolopoulos et al. 2005; Zhang and Pearce 2012: 73–98). Which of the two technological communities most strongly condition a subsidiary's current role, and which may be supplying the primary impetus towards its future progression and individualization, can be seen to reflect three overlapping dichotomies in technology sourcing (Zhang and Pearce 2012: 74–75). The first of these is whether a source of technology used by a subsidiary derives from its parent group or has been accessed externally. Here, internal sourcing is likely to support continuation of dependent supply roles (MS or ES), whilst significant exploration of alternative external sources would suggest the subsidiary is targeting the dynamic and individualizing aims of knowledge-seeking and creative initiatives. The second dichotomy then distinguishes between a technology that originates within the subsidiary itself and those that are sourced externally (including, but not now limited to, those from elsewhere in the parent group). Though it would be expected that 'an inhouse R&D unit [would] be central to the generation of . . . unique subsidiary-level technologies, we would also expect that part of its capacity to do this may derive from an ability to draw on complementary external sources' (Zhang and Pearce 2012: 74–75). Those collaborative external sources can then be internal to the group (other laboratories in other locations) or independently accessed (universities or other firms). The last dichotomy then distinguishes between technology sources secured within the host country (including those created by the subsidiary itself) and those obtained outside. Here, the expectation would be that technologies that are acquired or generated in the host economy will diversify the subsidiary's operations away from the dominant current competitive scopes of the parent MNE but, potentially, do so in ways that can be leveraged towards the group's wider progressive agendas.

An implication of the previous lines of argument suggest that *all* subsidiaries are positioned within a web of intra-group knowledge flows, but that this positioning becomes more pronounced and challenging when they contribute proactively to this by generating leverageable attributes and competences. This knowledge-flow differentiation has been categorized by Gupta and Govindarajan (1991, 1994, 2000). In their typology Gupta and Govindarajan (1991: 773–775, 1994: 445–446) designate a *global innovator* as responsible for a high outflow of knowledge to the rest of the group, but this innovator receives little inflow from it, so that its leverageable capacities are likely to derive rather idiosyncratically from local sources. The *integrated player* conforms more to the precepts of interdependent individualism, by again providing a considerable knowledge outflow but also accessing significant inflows (which may be integral to their innovative scopes).

If the leveraging of subsidiary-level competences is central to the innate *differentiation* of the contemporary MNE, it is similarly crucial to its *dynamism*. The need for constant competitive upgrading endemic to these firms is now, the themes developed here suggest, extensively addressed through subsidiaries which must inevitably themselves go through evolutionary restructuring. The potential for subsidiaries to be *set up* so as to be, ab initio, creators and distributors of new competitive competences is minimal. So accession to this role needs to be the result of internal evolutionary processes, probably operationalized through deepening interaction with a host country national system of innovation. The concept of a *creative transition* (Papanastassiou and Pearce 1994, 2009: 21–42) points to a vital tipping point in a subsidiary's progress. Before the transition it is dependent on standardized group technologies to supply established goods (MS and/or ES roles), after the transition it uses its own technologies to provide new goods (and knowledge) for the group. A number of studies (Birkinshaw 1996, 1997; Birkinshaw and Hood 1997, 1998; Birkinshaw et al. 1998; Taggart 1998a, b) analyse the process of subsidiary development in detail and point up the conditions determining its accession to an intra-group status as a knowledge source. Notably, Birkinshaw and Hood (1997, 1998) discern

subsidiary development and resource accumulation as open to parent company, host country and subsidiary drivers.

We can now see the contemporary MNE as a dynamic differentiated network in which a significant range of subsidiaries contribute, in diverse but interdependent and interactive ways, to the perpetually evolving competitiveness of the group. This competitiveness involves both the optimally effective application of the group's current technologies and products (MS and ES roles for subsidiaries) and also systematic pursuit of new knowledge to be embedded in extensions to the product range (innovation). The major repositioning in MNE strategic profiles, in terms of the second imperative, has been a move of responsibility for generation/accessing of new knowledge and product development away from hegemonic centralization towards a willingness and capacity to leverage subsidiary-level skills and competences into a group's inventive agendas. This can then allow MNEs to leverage differences in countries' creative scopes and potential towards their overall global competitive revitalization.

See Also

- ▶ Capability Development
- ▶ Multinational Subsidiary Mandates

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Levinthal, Daniel (Born 1957)

Sendil Ethiraj
University of Michigan, Stephen M. Ross School of Business, Ann Arbor, MI, USA

Abstract

This entry provides a selective overview of Professor Levinthal's contribution to the ongoing debates in strategic management. Specifically, the focus is on his contributions to the literatures on innovation, learning and organizational change.

Professor Levinthal's intellectual heritage may be traced to the Carnegie school in organization theory pioneered by Richard Cyert, James March and Herbert Simon. The Carnegie School sought to explain the emergence, functioning and performance of firms by resorting to realistic assumptions about human behaviour (e.g., bounded rationality, limited information, imperfect understanding of production functions and so on). Professor Levinthal's research, while drawing roots from the foundations of the Carnegie School, has had a broad impact on the strategic management literature. This entry shines a selective spotlight on his contributions to the literatures on innovation, organizational learning and organizational change.

Incentives for Innovation

The publication of Arrow's (1962) article, 'Economic welfare and the allocation of resources for invention', ushered the study of the incentives to innovate into the social science mainstream. In this classic piece, Arrow argued that, if we assume the production of innovations to be akin to the production of information, there is likely to be underinvestment in innovative activity. This is because the returns from innovations are less than fully appropriable (see Henderson 1993, for a brief survey of this debate).

Levinthal (Cohen and Levinthal 1989, 1990), in reversing the predictions of Arrow (1962), built on the idea that information has imperfect appropriability. He argued that the public good character of information does not mean that anyone with information will be able to exploit it. For instance, even though a group of scientists reverse engineered the genetic code of the devastating 1918 flu virus and published the genome (Taubenberger et al. 2005), it is unlikely that the average reader of this contribution will be able to reconstruct the flu virus after reading this article. This is because other complementary knowledge (and assets) is required to act on this information. Levinthal labelled this additional knowledge or competence '► absorptive capacity'. With his co-author, he argued that the greater is the potential for knowledge or information spillovers the greater is the incentive to invest in innovation. It is such investments that help build the requisite absorptive capacity to assimilate and exploit external knowledge. In sum, Arrow argued that the public good character of information will lead to reduced incentives to innovate. Levinthal countered that the greater the imperfections in the appropriability of innovation, the greater is the incentive to invest in innovation in order to acquire the absorptive capacity to benefit from such information spillovers. The article, published in 1990, is the most cited article ever published in *Administrative Science Quarterly*; it is considered a foundational article for innovation scholars and has spawned a vigorous debate on the incentives for and the effectiveness of innovation efforts.

Learning

In 1936, Theodore Paul Wright studied labour productivity in aircraft manufacture and documented the phenomenon that is widely known as experiential learning. He showed that workers improved with practice and that the slope of performance improvement can be characterized by a power law relationship wherein performance increases at a diminishing rate (Wright 1936). The identification of the mathematical relationship between practice and performance improvement led to a decades-long enterprise to study and document the beneficial effects of learning in a wide variety of contexts and settings (see Argote 1999, for a summary). Levinthal with his co-author March, once again challenged assertions that had been taken for granted in the learning literature (Levinthal and March 1993). He showed that learning at the individual level contributes to biases that lead us to temper the optimism with which we view learning at more aggregate levels, and argued that learning, by simplifying experiences and fostering specialized adaptation, also introduces myopia. He emphasized three forms of myopia: privileging of the short run over the long run, the tendency to emphasize local learning and ignore the big picture, and a tendency to overlook failures because of oversampling successes. This paper led to a robust scholarly conversation that explored the consequences of organizational search, learning and competence traps (see, e.g., Gavetti and Levinthal 2000; Siggelkow and Levinthal 2003; Gavetti et al. 2005; Knudsen and Levinthal 2007).

Organizational Change

A longstanding theoretical debate in the study of organization discusses the origins of organizational change. While one strain argues that organizational change occurs primarily at the population level via the death and replacement of entire populations of organizations (Hannan and Freeman 1977, 1984), a competing one argues that individual organizations can and do adapt to environmental contingencies (March and Simon 1958; Cyert and March 1963). The 1980s witnessed significant scholarly activity that viewed this debate as two competing theories (see, e.g., Singh et al. 1986a, b). Levinthal made two important contributions to this debate. In the empirical literature in the 1980s, an observed negative relationship between age and organizational mortality was cited as the evidence for the selection dynamic operating at the level of populations of organizations. The implied mechanism was that organizational mortality declines with age

because evolutionary forces favour organizations that are reliable. In other words, the negative relationship between age and mortality is rooted in lower organizational performance variability over time and the selection-driven elimination of variability. Using a simple model, Levinthal showed that a random walk process would suffice to explain the relationship between age and mortality (Levinthal 1991b). In his model, older organizations that had higher performance in the past found that this, in turn, buffered them from selection pressures and helped increase their survival rate. Thus, it is not that age reduces the variability of organizational performance but that prior performance buffers them from stochastic shocks to performance. This contribution led to a greater focus on dynamic models of organizational change and the effects of selection and survival on future adaptation and performance.

In a second contribution to this literature, Levinthal, in a short, verbal argument, offered the conjecture that organizational adaptation and population-level selection may be interrelated, rather than competing, processes driving organizational change (Levinthal 1991a). Subsequently, he formalized his argument in a simulation model (Levinthal 1997). He showed how organizational-level adaptation might provide the basis for the stable organizational heterogeneity that underlies the differential selection of organizations at the population level. Thus, he was able to show that organizational adaptation and population selection are complementary rather than competing mechanisms. This contribution to the literature on organizational change also introduced the ▶ rugged landscapes modelling platform to the strategic management audience that has had a significant impact on a range of topics including innovation, organization design and intraindustry performance heterogeneity.

Professor Levinthal has also had a significant impact through his editorship of the premier journals in the field, first as Editor for the Strategy Department at *Management Science* and currently as the Chief Editor for *Organization Science*. He has also been a prolific and outstanding mentor of doctoral students who have built on and extended his contributions to strategic management (see, e.g., the work of Jeho Lee, Ron Adner, Giovanni Gavetti, Sendil Ethiraj, Christina Fang, Hart Posen, Brian Wu and Felipe Csaszar, among others).

See Also

- ▶ Absorptive Capacity
- ▶ Learning and Adaptation
- ▶ Rugged Landscapes

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Liability of Foreignness

Lilach Nachum
Baruch College, Department of Marketing and International Business, New York, NY, USA

Abstract

This entry presents a definition of the construct 'liability of foreignness' as a term that describes the costs associated with business activity in foreign countries. It presents major theoretical and methodological developments within this area, which include attempts to identify the sources of these liabilities, examination of the country, firm and time contingencies that determine their prevalence, as well as methodological approaches to the operation and measurement of this construct. The entry concludes with a discussion of recent extensions that conceptualize the consequences of foreignness more broadly, and identify circumstances whereby it is an asset rather than a liability.

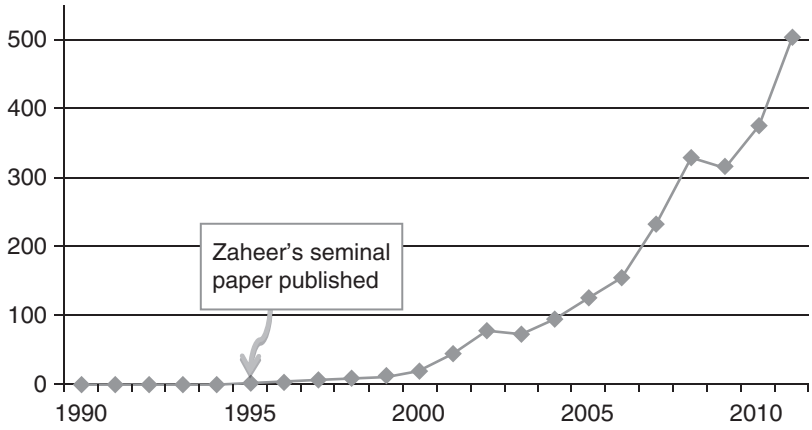
Definition The 'liability of foreignness' is a term describing the additional costs that firms operating outside their home countries experience above those incurred by local firms. These costs originate in limited local knowledge, local stakeholders' discriminatory attitudes and the difficulties of managing organizations whose subunits are separated by time and distance.

The Origin of the Concept: Early Theoretical Developments

The term 'liability of foreignness' (LOF) was coined by Zaheer in her seminal work (Zaheer 1995) to refer to the additional costs that firms operating internationally experience in relation to local firms. Zaheer built on an earlier contribution by Hymer (1960) that theorized the costs experienced by firms investing overseas as a fundamental aspect of the theory of foreign investment. Zaheer refined the concept, and supplemented the economic approach that characterizes Hymer's theorization with an organizational perspective that stresses liabilities that arise from lack of local knowledge and unfamiliarity with the norms and social expectations in foreign countries.

Zaheer's work has sparked substantial research interest in the costs associated with foreign activity. A Google Scholar search of articles containing the phrase 'liability of foreignness' yielded 505 hits in 2011, up from 3 in 1995, when Zaheer's paper was published (Fig. 1).

The initial research focused on enquiries into the origin of the LOF. Scholars identified costs originating in discriminatory attitudes towards foreign firms by local stakeholders who often prefer to deal with local firms, as well as host governments whose discriminatory policies put foreign firms at a disadvantage relative to local firms (Hymer 1960; Zaheer 1995). Others, building on organization theory and sociology, have studied costs resulting from the often conflicting conformity pressures of the local environment and the parent, and the difficulties associated with being controlled remotely by a parent that may lack understanding of the local market (Westney 1993).



Liability of Foreignness, Fig. 1 Number of articles with the term 'liability of foreignness" (Google Scholar)

Refinements of the Concept

Building on these contributions, subsequent research sought to identify the contingency conditions under which the LOF manifests itself. This research identified several home and host country characteristics that affect the extent to which firms experience the LOF (Miller and Parkhe 2002). Other studies have focused on firm characteristics to explain why certain firms are more likely to experience the LOF than others (Mezias 2002; Miller and Eden 2006; Nachum 2010). Yet others study the changing dynamics of the LOF over time (Zaheer and Mosakowski 1997), suggesting that although the LOF includes some costs that are permanent, most of the costs are apparent at the time of entry and tend to dissipate and may completely disappear over time.

There have also been attempts to deepen the theoretical underpinning of the classification of the factors that constitute the costs and advantages (Nachum 2011). This research distinguishes between costs and advantages that are experienced at different levels within the MNE (the organization as a whole, HQs, affiliates), as well as identifying the extent of control MNEs have over these factors (Mezias 2002). Notwithstanding variations across countries, firms and time, this research finds evidence that foreign firms underperform comparable local firms, a performance gap that is attributed to the liabilities they experience on the ground of their foreignness (Mata and Portugal 2002; Mata and Freitas 2012). These findings have generated interest in exploring ways to mitigate the LOF. Hymer (1960) was explicit in recognizing the superior advantages that foreign firms have relative to local firms, which enable them to overcome the LOF and compete successfully with them. Subsequent research has refined the understanding of these superior advantages. Zaheer (1995) suggested that, in addition to building on their parents' advantages (Hymer 1960), foreign affiliates can mitigate their liabilities by imitating the practices of successful local firms. Luo et al. (2002) distinguished between defensive and offensive strategies, referring, respectively, to greater reliance on the parents and on formal institutions in host countries, and deeper local embeddedness, as complementary means of dealing with the LOF.

Measuring the LOF

Along these theoretical developments, considerable attention has been given also to methodological issues related to the operation of the LOF and the study design for its testing. Most research operationalizes the LOF by some performance indicators, measured relative to comparable local firms (Zaheer 1995; Miller and Parkhe 2002; Nachum 2003; Miller and Eden 2006). A few studies have relied on other measures, such as survival (Zaheer and Mosakowski 1997; Mata

and Portugal 2002; Kronborg and Thomsen 2009; Mata and Freitas 2012), labour law suits (Mezias 2002) and innovation (Un 2011). The employment of multiple and varied measures is important in that different measures are informative of different aspects of the LOF.

Some research attention has also been given to the unit of analysis that is appropriate for the study of the LOF. The LOF is experienced by the parent firm and the affiliates, as well as by their employees, but it is manifested in different ways. Most research in this area is conducted at the level of the affiliates and, subsequently, the theory of the LOF is most developed in relation to this level of analysis. In an interesting recent contribution, Mezias and Mezias (2011) study the LOF at the individual level, and show the importance of varying levels of analysis, which reveal different aspects of the LOF.

The prevalence of the LOF depends on the local firms with whom foreign firms are compared, and hence the structure of the local sample that is employed as the benchmark is critical. A few studies examined matched samples of foreign and local firms, and were able to isolate the impact of foreignness from many other causes of the differences between these firms (Zaheer 1995; Nachum 2010). A number of studies distinguished between purely domestic local firms and local MNEs, and show that many of the differences between foreign and local firms disappear when foreign firms are compared only with local MNEs (Jungnickel 2002; Nachum 2010). This suggests that liabilities attributed to foreignness may in fact originate in geographic scope.

Is Foreignness an Asset or a Liability?

Perhaps the most significant theoretical development since the introduction of the concept has been undertaken by recent research that has questioned the assumption that the LOF is part and parcel of foreign activity. Inspired by the observation that, under certain circumstances, foreignness appears to be an asset rather than liability, Nachum advanced theoretical frameworks that attribute this variation to the type of advantages that matter in a given context (Nachum 2003), and to the context-specific balance between the costs and advantages that foreign firms have relative to local firms (Nachum 2010). Kronborg and Thomsen (2009) show that foreign affiliates enjoy what they name 'survival premium' over local firms, a finding they interpret as suggesting that foreignness is associated with advantages rather than liabilities. Adopting an institutional perspective, Edman (2009) demonstrated that the freedom from the constraints of local institutions that foreign firms enjoy affords them strategic choice that local firms are deprived of and translates into a ▶ competitive advantage. In a similar spirit, Siegel et al. (2010) show that being an outsider frees foreign firms from the constraints of local norms and, as a result, provides them access to local resources that local firms cannot utilize. Un (2011) extended this line of research by suggesting that the advantages of foreign affiliates originate in the incentives they have to extract commercial value from their R&D investments, which are stronger than those that local firms have. She suggested that these are more potent sources of advantages than the technological capabilities of their parents, as theory suggests (Hymer 1960).

Taken together, this research acknowledges that the consequences of foreignness are more complex and nuanced than those recognized in the initial LOF research. It further implies that the consequences of foreignness are inherently varied, and calls for research that will uncover the logic beyond these variations, and offer theoretical extensions needed to accommodate them.

See Also

- ▶ Competitive Advantage
- ▶ Global Strategy
- ▶ Imperfect Resource Mobility
- ▶ Intangible Assets
- ▶ International Business
- ▶ Multinational Corporations

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Licensee

Peter Grindley
Berkeley Research Group, London, UK

Definition A licensee is a firm or individual that in-licenses rights to use the property of another party, the licensor. In return it pays royalties or other compensation. This may allow the licensee to access proprietary technology, avoid patent litigation, commercialize another brand or enter a new market. By combining its complementary assets with outside technology this expands the use of an innovation.

A licensee is a firm or individual that in-licenses the right to use the intellectual property (IP) from another organization, the ▶ licensor. The licensee's motive may be to access proprietary technology, commercialize another brand, extend its product portfolio or enter a new market segment. It may in-license rights to an entire product or only to a specific item of IP.

In-licensing may be a quick and potentially inexpensive way to obtain technology, provided the owner is prepared to out-license it. This leverages out the licensee's complementary assets in manufacturing and marketing, and its existing IP, by combining these with outside technology. This may enable a firm with an established market presence to enter a new segment, mirroring the interests of the licensor to commercialize its technology more widely. An advantage of in-licensing is that this gives the licensee flexibility to choose between technologies and select the most successful – in-house development may lock a firm into an unsuccessful technical trajectory.

Often a licensee needs more than just technology. Licences for the joint exploitation of a new technology may be complex, involving not just

patents but also trade secrets, know-how and training in how to use the new technology and other guidance. Licences may be exclusive to ensure a more certain return to underpin the necessary investments. A licensor may seek out licensees to commercialize an innovation which it cannot exploit alone. When Pilkington out-licensed its float glass technology in the 1960s it approached major glass producers to commercialize this quickly in countries where it had no operations. The technology was quite different from existing plate and sheet glass and licensees required extensive know-how and training. Out-licensing also led to faster improvements in the technology, by both licensor and licensees, than might otherwise have been possible. The result was very fast diffusion of float glass worldwide and the eventual replacement of previous technologies in all flat glass segments, with major benefits to licensees and licensor as well as consumers.

Pure patent licences may be a straightforward exchange of rights to use the patent in return for a royalty payment. A firm familiar with the technology may in-license patents to expand its range of products, such as in pharmaceuticals. A firm may in-license patents to avoid litigation – a familiar situation in complex technology industries such as in the area of information and communications technology (ICT) where firms work in similar technical areas and may infringe each other's patents inadvertently. Such cases are often handled by cross-licensing since there may be mutual infringement, although if the firms are active in different industry segments a one-way licence may be all that is needed. However, the licensor may be a non-manufacturing entity (NME) with no interest in cross-licensing.

A drawback to in-licensing is that the licensee can only access IP the owner is prepared to out-license. The owner may keep cutting-edge IP, central to its competitive advantage, to itself and only out-license generic technology. The licensee may also become dependent on the licensor for future improvements. Unless the licensee has other capabilities that the licensor cannot replicate, the licensee risks providing an evolutionary route for the licensor to enter a market, creating demand but later being excluded by improved technology. The licensee may protect itself against such possibilities with grant-forward clauses in the license that require the licensor to also license any improvements it makes to the technology. Alternatively, the licensee may in-license technology as a basis for developing its own, a surer foundation for competitive advantage.

Most of these concerns reflect similar concerns for the licensor, and should be allowed for in the licence terms and conditions. Unless risks can be reduced one or other party may need to adjust the royalty to include a risk premium – this may be so great that no mutually acceptable royalty range exists and ▶ licensing fails, even though the underlying economics of licensing may be favourable.

See Also

- ▶ Complementary Asset
- ▶ Innovation Strategies
- ▶ Licensing
- ▶ Licensor

Licensing

Peter Grindley
Berkeley Research Group, London, UK

Abstract

An intellectual property licence grants a licensee rights to use intellectual property (IP) owned by others. The licensee is granted an exchange for a royalty or other financial or non-financial consideration. Licensing enables an intellectual property (IP) owner to commercialize an invention more widely by accessing complementary capabilities of other firms to bring it to market. Licensing can expand the use of an invention and the earnings of the owner, increasing incentives for innovation

and speed diffusion. The consideration received for a licence depends on the commercial usefulness of the invention as well as on the strength of the appropriability regime. Licensing carries risks and unless used carefully may not be as profitable as in-house commercialization where that is feasible.

Definition Licensing is the contractual grant by a property owner (the licensor) to another party (the licensee) of rights to make, use and sell products in which the intellectual property (IP) is embedded.

In licensing, the owner (the ▶ licensor) grants the other party (the ▶ licensee) rights to use its property under certain conditions, in return for a royalty payment or other consideration. Licensing is used for various types of intellectual property (IP) such as patents, copyright, trademarks and know-how, often in combination. This corresponds with a general definition of licensing as permitting something that would otherwise be prohibited.

How Licensing Works

Licensing enables an IP owner to commercialize an invention more widely than it might be able to do alone. An inventor of new technology may not have complementary capabilities in development capacity, state-of-the-art manufacturing, marketing or geographical location or complementary technology needed to bring an invention to market (Teece 1986). To access these capabilities it may out-license its technology for use in certain markets to other firms. In some cases a firm's technology may already be infringed by others and the patent owner offers out-licences to earn value and to avoid or settle litigation.

The most straightforward type of licence is a one way licence between a single licensor and a single licensee for a single item of IP. Other types include cross-licences, in which each party has IP used by the other, and patent pools, which combine the patents of several owners in a single out-licence (Grindley and Teece 1997). Licences may also contain several different types of IP in a single agreement – a software licence may include patents, copyrights and trademarks. More complex licences may combine patents with know-how or be a core of a joint venture.

In return the inventor receives a royalty or other consideration. Some licences are royalty-free with the licensor rewarded in other ways, such as by a supply of components or by a first mover advantage in the market.

The ability to use licensing depends on the appropriability regime protecting the IP. With strong IP protection the licensor is better able to engage in the technology market, to restrict unlicensed use and set licensing conditions. If IP protection is weak, or the transfer of knowledge is expensive, then licensing may be unattractive. The owner may be unable to stop unauthorized use of its IP and may need to use its invention only in-house, keeping it secret. Licensing of patents, with a strong patent regime, may be simpler than other forms of IP.

Licensing Strategies

Licensing may be central to the firm's business strategy or simply an additional source of income. For the licensor, if there are market opportunities which the owner cannot exploit itself, in an area not central to the firm's strategic advantage, then it may consider doing so via licensing (Teece 1986; Sherry et al. 2000). A more general issue may be whether the IP owner believes it can earn a better return in its core product areas by exploiting its technology in a proprietary niche or by sharing a large market. Sharing its technology may enable it to expand the total market and establish its approach as a dominant design, benefiting from first mover advantages as well as earning royalties. A concern is whether licensees are likely to strengthen the technology and the inventor's position, or gradually take over the market. The licensor may guard against these risks via licensing restrictions such as grant-backs but in the long term it may need to remain active in leading technology development. In either case it may

consider setting up an out-licensing activity to earn revenue from the use of its IP in segments where it does not compete (Sullivan and Fox 1996).

For the licensee, in-licensing enables the firm to access technology that would otherwise be costly and time-consuming to invent, or that simply may not be available. Licensing can provide a quick way into a new market segment, giving a route into a technological area until the licensee can build up its own capability. Concerns are that in-licensing may be expensive and the licensee may have little control over the technology. It may have to accept non-leading-edge technology and, once committed, the licence might not be renewed on equivalent terms.

Licensing may combine patents, know-how and other assistance. Know-how licences are more complex than pure patent licences, especially as they may essentially create a competitor, and command higher royalties. They may be a basis for other business arrangements such as joint ownership, supply agreements or shared investments.

Licensing Conditions

Several types of licensing conditions (or 'restrictions') may be included to reduce risks and make it more likely that agreement can be reached.

- Geographical or product area restrictions enable the licensor to access capabilities in segments where it is not active while reserving its technology for its own use elsewhere.
- Exclusive rights provide greater incentives for the licensee to invest, and may earn more royalty in cases where a single licensee can adequately exploit the invention. Non-exclusive rights provide broader access to a market and may be more appropriate in other cases.
- Most favoured nation (MFN) clauses require that existing licensees are offered equivalent terms as later licensees, protecting early licensees.
- Grant-backs provide the licensor rights to use improvements made by the licensee to the original technology, to avoid excluding the inventor from the market it created.
- Grant-forward provisions allow the licensee access to future improvements in the technology by the licensor, to ensure that the licensee has access to up-to-date technology.
- Subcontracting rights feature in some licensing agreements.

Royalty Earnings

Setting royalty rates is as much art as science. Rates are the outcome of negotiations based on at least three factors: the estimated contribution of the technology to product earnings, the quality of the IP portfolio and the relative bargaining power of the parties. In the case of patent portfolios, this relationship may be put as an equation: royalty rate $= \theta \times \beta \times V$, in which θ is a measure of portfolio quality, β the relative bargaining power of the parties and V the value added by the technology (Lemley and Shapiro 2007). While useful conceptually, the parameters are difficult to estimate in practice and the views of the parties are likely to differ. It is difficult to estimate the contribution of technology to product value, especially for new technologies. The licensed technology may be only part of the necessary technology, making it harder to separate out individual contributions. Bargaining power also includes a range of influences, from the 'personalities' of the firms and their negotiators to specifics of the licence, to general economic conditions.

In practice, royalty rates may combine estimates of the incremental profit contribution of the IP, the costs of inventing around the technology and market rates for equivalent technologies. If multiple technologies from multiple owners are needed then allowance may be made for 'royalty stacking' to assess each contribution. Rates may then be adjusted depending on bargaining conditions.

It may also be difficult in practice for a licensor to claim more than a fraction of the total expected earnings. Commercialization involves considerable risk and the licensee must earn a

return on its investments in development, manufacturing and marketing as well as pay royalties (Caves et al. 1983). The licensor and potential licensees may have difficulty agreeing on the value of an invention, especially for untried technology, due to information asymmetries and other transactions problems. The preparation and technology transfer costs of the licence may be high. Finally, there may be competition between technical alternatives. All these tend to lower the portion of the earnings available for the technology developer.

The proportion of the estimated profit to allocate to the technology depends on the circumstances. A rule of thumb sometimes suggested for single technology/single product cases is the '25% rule' which would assign a quarter of the estimated profits to the technology (Goldscheider et al. 2002). At best this is only one indication for negotiations and may not reflect the factual circumstances of the licence. In more complex cases with multiple technologies and patent holders, only a detailed analysis of the contribution of each technology and the costs of inventing can give an indication. Much depends on the negotiations. There are many variables in a licensing situation and any rule should only be seen as one potential factor.

Royalties may be structured in several ways. The most common are running royalties (such as a percentage of sales or amount per unit), lump sum payments or combinations. Earnings are not necessarily in cash – in a joint venture they may be paid in kind. Some licences may be royalty-free if the licensor obtains benefits from general use of its technology, though still subject to conditions. The choice of royalty type depends on circumstances and the parties' preferences. Although the form of payment may change the cash figure, the underlying earnings are likely to be equivalent after adjusting for terms.

The structure of the royalty payments impacts the sharing of risk between the parties and the effective royalty rate. Licensing earnings should be evaluated according to the full payment structure, which can include running royalties, lump sum payments or combinations of these. For example, up-front lump sum payments of a guaranteed amount to the licensor are usually seen to reduce the licensor's risk, so allowing for this may lead to a lower apparent rate.

Design Firms and NMEs

A particular form of licensing is by non-manufacturing entities (NMEs), which are not involved in the product market and whose business model is purely to out-license technology. These may out-license unused patents of firms that are no longer active in a product area or have left the industry. Although sometimes criticized, NMEs may enable a more efficient technology market by specializing in invention and/or licensing (McDonough 2007). They may also offer a way to earn value from the intangible assets of failed firms, encouraging innovation. NMEs also include design firms which develop and out-license leading-edge technology without manufacturing, effectively outsourcing development for manufacturing firms. Their success depends on continual innovation to create valuable IP to licence. They may combine licensing with customized development services.

See Also

- ▶ Appropriability
- ▶ Complementary Asset
- ▶ Cross-Licensing
- ▶ Licensee
- ▶ Licensor
- ▶ Markets for Technology

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Licensing Strategy

Ashish Arora
Duke University, The Fuqua School of Business, Durham, NC, USA

Abstract

The contractual granting of rights to use technology is commonly called a license. Licensing has become more prevalent since the 1980s. Licensing revenue has to be balanced against the lost profits from greater competition. More competition in the product market favours licensing. Stronger intellectual property (IP) protection also favours licensing, especially in firms that lack manufacturing or marketing capability. On the demand side, firms may choose to license in technology instead of developing it internally. However, taken as a whole, licensing is complementary to internal research and development (R&D); that is, firms that invest internally in R&D are effective in using licensed technology. Understanding how firms should organize their licensing activities is an exciting area for future research.

Definition A company provides contractual rights to allow the legal sharing of technology and/or intellectual property with another, for payment or other considerations.

Some firms specialize as technology suppliers, relying upon licensing for revenues. More frequently, instead of only using their innovations internally, firms can profitably license their technologies to others. Licensing was widespread in the USA in the nineteenth century, declined in importance thereafter, but has regained importance since the 1980s (Arora et al. 2001).

Extent and Growth of Licensing

Robbins (2006) estimates that in the USA the corporate supply of licensing of industrial processes has grown at 13% per annum between 1995 and 2002, rising from $27.4 billion in 1995 to $92 billion in 2002. In a similar study, Zuniga and Guellec (2008) note that patent licensing is widespread in their sample of 600 European and 1,600 Japanese firms in 2007. Although cross-border licensing and cross-licensing are both important, neither type accounts for the bulk of licensing activity reported. Furthermore, licensing activity appears to have increased between 2003 and 2006. Licensing is more prevalent in the chemicals, pharmaceuticals and information technology (IT) industries (Anand and Khanna 2000; Arora et al. 2001).

Overall, the data indicate that licensing is more widespread in America and Japan than in Europe, and that licensing has increased since the mid-1990s in the developed economies.

Though substantial in absolute value, licensing as an activity is still not central to the innovation process, although there are some notable exceptions such as bio-pharmaceuticals (Somaya et al. 2011). Nor, once again with notable exceptions such as chemicals and petroleum refining, is licensing the dominant form of technology flows across firms. However, licensing by American universities has become more widespread (Mowery et al. 2001).

When Is Licensing Profitable?

Sometimes, licensing is needed to enable complementary technologies to be combined into commercial products and services. Large firms often cross-license each others' patents, especially in

the IT sector (Grindley and Teece 1997). Firms may also license to avoid antitrust scrutiny or a challenge to the patent. Economic models of strategic licensing include deterring entry (Gallini 1984; Rockett 1990), increasing demand (Shepard 1987) or establishing standards.

Setting aside such motives, when should a firm license? Teece (1986) provides a widely used framework: An innovator trades off the inefficiency in the licensing market that results from imperfections in the market for technology with the additional cost involved in commercializing the technology itself. Strong intellectual property protection makes licensing more attractive; by contrast, when technology is largely tacit – for instance, because the underlying scientific base is immature – licensing is less attractive. Similarly, if the technology holder is short of cash or time or lacks manufacturing or marketing capabilities, licensing becomes a more attractive option (Teece 1986).

Complementary assets condition how intellectual property protection influences licensing strategy. Arora and Ceccagnoli (2006) develop a model where downstream assets condition the impact of patent protection. Empirically, they find that stronger patent protection increases licensing by small firms and firms that lack downstream assets, but not by large firms.

Licensing Revenue Versus Rent-Dissipation Effects

Katz and Shapiro (1986) analyse the optimal number of licensees for a single technology holder who does not compete in the product market. When the innovator is also a producer, licensing additionally implies an increase in competition and an erosion of rents in the product market. Arora and Fosfuri (2003) develop a model in which multiple technology holders compete, both in the technology market and in the product market. The technology holder has to balance the revenue from licensing and the rent-dissipation effect produced because licensing will increase the level of competition in the product market. This trade-off depends upon competition in the product market. If the licensee operates in a 'distant' market, rent- dissipation will be smaller than when the potential licensee is a close substitute. Arora and Fosfuri show that product market competition enhances licensing because rent dissipation falls faster than licensing revenues as product market competition increases. Lieberman (1989) finds that licensing was less common in concentrated chemical products.

Arora and Fosfuri also point out that licensing is more likely when products are homogeneous because a licensee is closer in the product space to the licensor than to other producers in differentiated markets, implying that general purpose technologies are more likely to be licensed (Gambardella and Giarratana 2010). Consistent with this, Fosfuri (2006) finds that licensing is lower in markets where there is a high degree of technology-specific product differentiation.

The Arora–Fosfuri framework also implies that smaller firms are more likely to license, because they suffer less from rent dissipation from additional competitors. This is consistent with the experience in the areas of biotechnology (Arora and Gambardella 1990), semi-conductor (Hall and Ziedonis 2001) and software security (Giarratana 2004).

Demand for Licenses

To license successfully, one must understand the motives and goals of potential licensees. This topic has received far less attention.

Make Versus Buy

The transaction cost view posits that in-licensing is a substitute for internal R&D (Williamson 1985; Pisano 1990), where contracting costs and other imperfections favour internal R&D. For the most part, studies conclude that internal R&D and licensing are complements rather than substitutes (Mowery 1983; Cassiman and Veugelers 2006), typically because firms investing in R&D are also those more likely to license in technology. The apparent complementarity may reflect concerns about the inefficiency of licensing contracts. Gans and Stern (2000) develop a model where the potential buyer engages in R&D to increase bargaining power in licensing negotiations.

Insofar as internal efforts are successful, this will reduce the demand for external technology.

Absorptive Capacity

Another reason for the apparent complementarity is that licensees often have to be technically sophisticated themselves, at least until the technology itself becomes highly standardized. Cohen and Levinthal (1989) argue that this technical sophistication, which is called absorptive capacity, arises when the firm conducts R&D internally. Arora and Gambardella (1994) show that that firms with greater ability to use external technology are more likely to in-license, whereas firms that can evaluate external technology better will make less use of licensing. The intuition is that in-licensing newly developed technology is like purchasing a real option, because licensing fees are substantially smaller than the investments needed to use the technology.

Licensing as a Strategy: Recent Research and Open Questions

Much of the existing research has focused on licensing transactions. The most exciting area of research now is to understand how licensing interacts with firm structure and strategy. For start-ups, licensing is a potentially viable business model. Consistent with Teece (1986) and Gans et al. (2002) suggest that licensing is more attractive when patent protection is strong and complementary assets are important. Bresnahan and Gambardella (1998) point out that specialization in licensing is more valuable when there are many potential licensees rather than a few large ones. How should large firms organize licensing and IP management – for instance, should business units be in charge or should this function be centralized?

A similar set of questions arise for in-licensing. Chesbrough (2003) has highlighted the Open Innovation Model, in which firms complement internal innovation with external innovation and knowledge. Though firms may also choose not to license in technology to motivate their own employees to innovate (Rotemberg and Saloner 1994), there is very little systematic research that deals with the relationship between in-licensing and the internal organization of innovation.

See Also

- ▶ Appropriability
- ▶ Management of Technology
- ▶ Open Innovation

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Licensor

Peter Grindley
Berkeley Research Group, London, UK

Definition A licensor is a firm or individual that out-licenses rights to use its property to another party, the licensee. In return it receives royalties or other compensation. This allows the licensor to access complementary assets and expand the market for an innovation, earning a greater return. By increasing returns, out-licensing may encourage innovation and diffusion.

The licensor grants rights to use its property to another firm, the ▶ licensee, in return for royalties or other compensation. Applied to intellectual property (IP) this may cover a product, trademark, patent, know-how, copyright or brand. A manufacturer may out-license rights to sell its products in a new market, a patent owner its technology to a competitor or a brand owner the use of its logo. This extends the ways in which an IP owner can commercialize its invention and earn a return. A licence might be an arm's-length agreement to use IP or might be part of more extensive technology transfer.

Objectives

Out-licensing is a way of increasing earnings from innovation. The licensor 'leases' the use of an idea to bring it to market without the expense and risk of raising capital, development, production, marketing and distribution, while still keeping the rights under its control. The licensor accesses complementary assets to commercialize an innovation more widely in return for a share of the ▶ licensee's profits. ▶ licensing may be combined with in-house use to extend an invention into a different country or market segment. For example, in the 1960s Pilkington developed a float glass technology. In addition to using the process itself, it out-licensed it worldwide as a means of

accessing markets that it did not have the scale to enter itself, thereby transforming the flat glass industry.

The licensor may also out-license its technology to firms in the same industry. A firm's patents protect its technology but also have value to other firms, which may infringe the patents or invent around the technology if not licensed. The licensor's own market share may be limited, restricting its earnings from in-house use. Some patents may have outlived their relevance to the firm's business. By out-licensing the owner earns royalties and may establish its technology more widely, with potential first-mover advantages. A licensing programme may review a portfolio to identify patents with licensing potential and match these with potential licensees. If patents do not protect current business and do not seem to be valuable for out-licensing the owner may abandon or sell them.

An increasingly important type of licensor is the non-manufacturing entity (NME) which out-licenses patents but does not make products. The patents may be from firms which have exited the product market or underused patents sold off by firms. NMEs also include specialized design firms whose business plan is to develop technology expressly for licensing rather than manufacture. Although not always popular, NMEs extend the technology market. They may enable failed firms to earn a residual return on technology, encouraging innovation.

Out-licensing may combine patents and know-how to enable a licensee to enter an area in which it previously has little capability. Know-how licences are complex agreements including technology transfer and various safeguards. They typically involve higher royalties than pure patent licences. A know-how licence provides an entrant with the capability to start up in competition and the licensor should be compensated for this.

A licensor may license technology either exclusively or non-exclusively. Exclusive rights to use an innovation in an area may encourage the licensee to make necessary investments in commercializing the technology and earn a higher royalty. If the technology is not sufficiently distinct or difficult to emulate to justify exclusivity then licences may be non-exclusive.

Risks

The use of licensing depends in part on the IP ▶ appropriability regime and the ability of the owner to exclude unlicensed use. If competitors cannot easily imitate an invention then the licensor has the power to decide how it can best be exploited. If competitors can imitate an invention quickly the innovating firm may still benefit from out-licensing if this helps to ensure that its version of the technology becomes a dominant design, thereby giving it a first mover advantage – especially if the technology is included in standards. It also receives royalty payments.

Licensing may be a valuable way to increase earnings since it involves few direct costs and royalties go straight to profits. However, in many cases the licensor may only obtain a fraction of the earnings possible if it exploits the invention itself. The licensee takes the larger share of the investment risk and wants to be compensated. There may be competition in the technology market and patent infringers may be unwilling to take licences. Only if the invention is critical to a new product area, and the appropriability regime is strong, is the licensor able to claim a large share of profits. A further risk is that the licensor may lose control of further development of the technology to licensees. The licensor can protect itself by grant-back provisions to use licensees' improvements but to continue a licensing programme it will eventually need to add new technology.

See Also

- ▶ Appropriability
- ▶ Asymmetric Information
- ▶ Innovation Strategies
- ▶ Licensee
- ▶ Licensing
- ▶ Licensing Strategy

Linear Programming

Rajeev Bhattacharya
Berkeley Research Group, Boston, MA, USA

Abstract

An optimization problem with a linear objective function and linear constraints is called a linear programming problem. A vector satisfying the inequality and non-negative constraints is called a feasible solution. If a linear programming problem and its dual have feasible solutions, then both have optimal solutions, and the value of the optimal solution is the same for both. If either the program or its dual does not have a feasible solution, then neither has an optimal vector. The simplex method is a simple method of solving a linear programming problem.

Definition An optimization problem with linear objective function and linear constraint(s) is called a linear programming problem.

'Linear programming' appeared in the title of Dantzig (1949), but the diet problem of Stiegler (1945) and the transport problem of Hitchcock (1941) preceded it, and it seems J. von Neumann knew about the duality theorem by 1947. L. V. Kantorovich and N. Karmarkar also provided methods for solving linear programming problems. See Gale (1960), Dorfman et al. (1986), and Gaas (2003) for details.

Notation

$\mathbb{R} = \{x : x \text{ is a real number}\}$
$\mathbb{R}_+ = \{x \in \mathbb{R} : x \geq 0\}$
$\mathbb{R}_{++} = \{x \in \mathbb{R} : x > 0\}$
$\mathbb{R}^s = \{(x_1, x_2, \ldots, x_s) : x_i \in \mathbb{R} \forall i = 1, 2, \ldots, s\}$
$\mathbb{R}^s_+ = \{(x_1, x_2, \ldots, x_s) : x_i \in \mathbb{R}_+ \forall i = 1, 2, \ldots, s\}$
$\mathbb{R}^s_{++} = \{(x_1, x_2, \ldots, x_3) : x_i \in \mathbb{R}_{++} \forall i = 1, 2, \ldots, s\}$

Given $x, y \in \mathbb{R}^s$

$$x \geq y \Leftrightarrow x - y \in \mathbb{R}^s_+$$
$$x > y \Leftrightarrow x - y \in \mathbb{R}^s_+, x \neq y$$
$$x \mathbb{R} y \Leftrightarrow x - y \in \mathbb{R}^s_{++}$$

For an $(r \times s)$ matrix A, its tranpose is represented by A', its k^{th} row is represented by A_k, and its l^{th} column is represented by A^l.

$$0_r = \begin{pmatrix} 0 \\ \vdots \\ 0 \end{pmatrix} \in \mathbb{R}^r$$

$$0_{r,s} = \begin{pmatrix} 0 & \cdots & 0 \\ \vdots & & \vdots \\ 0 & \cdots & 0 \end{pmatrix} \text{ is the } r \times s \text{ zero matrix}$$

$$1_r = \begin{pmatrix} 1 \\ \vdots \\ 1 \end{pmatrix} \in \mathbb{R}^r$$

$$I_r = \begin{pmatrix} 1 & 0 & \cdots & 0 \\ 0 & 1 & \cdots & 0 \\ \vdots & \vdots & & \vdots \\ 0 & 0 & \cdots & 1 \end{pmatrix}$$

is the $(r \times r)$ identity matrix.

The Linear Programming Problem

Let the goal in the linear programming problem (*LP*) be to choose $x = (x_1, x_2, \ldots, x_n) \in \mathbb{R}^n$ to maximize the linear objective function

$$a_1 x_1 + a_2 x_2 + \cdots + a_n x_n$$

where $a_i \in \mathbb{R} \forall i = 1, 2, \ldots, n$, such that $x = (x_1, x_2, \ldots, x_n)$ satisfies the following m linear inequality constraints:

$$b_{11} x_1 + b_{12} x_2 + \cdots + b_{1n} x_n \leq c_1$$
$$b_{21} x_1 + b_{22} x_2 + \cdots + b_{2n} x_n \leq c_2$$
$$\vdots$$
$$b_{m1} x_1 + b_{m2} x_2 + \cdots + b_{mn} x_n \leq c_m$$

where $b_{ij} \in \mathbb{R} \forall i = 1, 2, \ldots, n, j = 1, 2, \ldots, m$, $c_j \in \mathbb{R} \forall j = 1, 2, \ldots, m$, and the non–negativity constraints:

$$\begin{aligned} x_1 &\geq 0 \\ x_2 &\geq 0 \\ &\vdots \\ x_n &\geq 0 \end{aligned}$$

A linear minimization problem can be similarly defined.

Matrix Notation

The problem denoted LP above can be represented as follows:

$$\max a'x$$

such that

$$\begin{aligned} Bx &\leq c \\ x &\geq 0 \end{aligned}$$

where

$$x = \begin{pmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{pmatrix} \in \mathbb{R}^n$$

is an $n \times 1$ real matrix,

$$a = \begin{pmatrix} a_1 \\ a_2 \\ \vdots \\ a_n \end{pmatrix} \in \mathbb{R}^n$$

is an $n \times 1$ real matrix,

$$B = \begin{pmatrix} b_{11} & b_{12} & \cdots & b_{1n} \\ b_{21} & b_{22} & \cdots & b_{2n} \\ \vdots & \vdots & & \vdots \\ b_{m1} & b_{m2} & \cdots & b_{mn} \end{pmatrix}$$

is an $m \times n$ real matrix, and

$$c = \begin{pmatrix} c_1 \\ c_2 \\ \vdots \\ c_m \end{pmatrix}$$

is an $m \times 1$ real matrix.

Feasible and Optimal Vectors

A vector $x \in \mathbb{R}^n$ that satisfies the inequality and non-negativity constraints is called a **feasible solution** – i.e., an $(n \times 1)$ –matrix x satisfying

$$\begin{aligned} Bx &\leq c \\ x &\geq 0 \end{aligned}$$

is a **feasible solution**, and a linear programming problem that has a feasible solution is called a **feasible programme**.

A feasible vector $x^* \in \mathbb{R}^n$ that maximizes the objective function $a'x$ is called an **optimal vector**, and the maximum value $a'x^*$ is called the value of the linear programming problem (*LP*).

Canonical Form

A linear programming problem in canonical form is

$$\max f'x$$

such that

$$\begin{aligned} Gx &= h \\ x &\geq 0 \end{aligned}$$

where $x \in \mathbb{R}^n$ is an $n \times 1$ real matrix, $f \in \mathbb{R}^n$ is an $n \times 1$ real matrix, G is an $m \times n$ real matrix, and $h \in \mathbb{R}^m$ is an $m \times 1$ real matrix.

The only difference between the canonical form and the standard form represented earlier is that the canonical form has equality constraints.

One can replace the equality constraint

$$Gx = h$$

by two inequality constraints

$$Gx \leq h$$
$$-Gx \leq -h$$

and, therefore, the canontical form can be represented by a standard form linear programme

$$\max f' x$$

such that

$$\begin{pmatrix} G \\ -G \end{pmatrix} x \leq \begin{pmatrix} h \\ -h \end{pmatrix}$$
$$x \geq 0$$

Conversely, the standard form linear programme (*LP*)

$$\max a' x$$

such that

$$Bx \leq c$$
$$x \geq 0$$

is equivalent to the following linear programme in canonical form:

$$\max \begin{pmatrix} a \\ 0_m \end{pmatrix}' \begin{pmatrix} x \\ z \end{pmatrix}$$
$$(B \quad I_m) \begin{pmatrix} x \\ z \end{pmatrix} = c$$
$$\begin{pmatrix} x \\ z \end{pmatrix} \geq 0$$

where

$$z = \begin{pmatrix} z_1 \\ \vdots \\ z_m \end{pmatrix} \in \mathbb{R}^m$$

are called slack variables.

Duality

Consider again the linear programming problem (*LP*)

$$\max a' x$$

such that

$$Bx \leq c$$
$$x \geq 0$$

Then, the linear programming problem (*LP*′)

$$\min c' y$$

such that

$$B' y \geq a$$
$$y \geq 0$$

is called the dual to the linear programming problem (*LP*), where

$$y = \begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_m \end{pmatrix} \in \mathbb{R}^m$$

is an m × 1 real matrix.

Theorem (Duality Theorem)

1. If both *LP* and *LP*′ are feasible (i.e., if $\exists x \in \mathbb{R}^n$ such that $Bx \leq c, x \geq 0$, and $\exists y \in \mathbb{R}^m$ such that $B'y \geq a, y \geq 0$), then
   (a) Both *LP* and *LP*′ have optimal vectors x^* and y^* (i.e., x^* and y^* are feasible for *LP* and *LP*′, respectively, and $a'x^* \geq a'x$ for all x feasible for *LP* and $c'y^* \leq c'y$ for all y feasible for *LP*′).
   (b) The values of *LP* and *LP*′ are equal (i.e., $a'x^* = c'y^*$).
2. If *LP* or its dual *LP*′ is not feasible (i.e., if $\nexists x \in \mathbb{R}^n$ such that $Bx \leq c, x \geq 0$, or $\nexists y \in \mathbb{R}^n$ such that $B'y \geq a, y \geq 0$), then neither *LP* nor *LP*′ has an optimal vector (i.e., $\nexists x^* \in \mathbb{R}^n$ such that x^* is feasible for *LP*, $a'x^* \geq a'x$ for all x feasible for *LP* and $\exists y^* \in \mathbb{R}^m$ such that y^* is feasible for *LP*′ and $c'y^* \leq c'y$ for all y feasible for *LP*′).

Complementary Slackness

Theorem (Complementary Slackness Theorem) Let x be a feasible solution of (LP) (i.e., $Bx \leq c, x \geq 0$), and let y be a feasible solution of (LP') (i.e., $B'y \geq a, y \geq 0$).

Then, x is an optimal solution of (LP), and y is an optimal solution of (LP'), if and only if:

1. $B_j x < c_j \Rightarrow y_j = 0$ (i.e., if the slack variable corresponding to a particular inequality of (LP) is positive, then the corresponding variable in (LP') is 0).
2. $B'_i y > a_i \Rightarrow x_i = 0$ (i.e., if the slack variable corresponding to a particular inequality of (LP') is positive, then the corresponding variable in (LP) is 0).

Simplex Method

Definition: Let $p = (p_1, \ldots, p_r)$ be a $(k \times r)$ matrix such that $p_i \in \mathbb{R}^k \forall i = 1, \ldots, s$, and $q = (q_1, \ldots, q_s)$ be a $(k \times s)$ matrix such that $q_j \in \mathbb{R}^k \forall j = 1, \ldots, s$ are linearly independent. Let

$$T = \begin{pmatrix} t_{11} & \ldots & t_{1s} \\ \vdots & & \vdots \\ t_{r1} & \ldots & t_{rs} \end{pmatrix}$$

be such that $p = Tq$ (i.e., each p_i is a linear combination of the s vectors $(q_1, \ldots, q_s)$). Then, the matrix T is called the tableau of $(p_1, \ldots, p_r)$ with respect to the basis $(q_1, \ldots, q_s)$.

The fundamental idea behind the simplex method is to replace one member of the basis $(q_1, \ldots, q_s)$ with one of the $(p_1, \ldots, p_r)$ and iterate until no further improvement is possible.

Theorem (Replacement Theorem) If $t_{uv} \neq 0$ (called the pivot of the replacement operation), then $(b_1, \ldots, b_{u-1}, a_v, b_{u+1}, \ldots, b_m)$ is a basis with the new tableau $\tilde{T} = \left(\tilde{t}_{ij}\right)_{i=1, j=1}^{m, n}$ such that

$$\begin{aligned} \tilde{t}_{ij} &= t_{ij} - \frac{t_{iv}}{t_{uv}} t_{uj} \forall i \neq u \forall j \\ \tilde{t}_{uj} &= \frac{t_{uj}}{t_{uv}} \forall j \end{aligned}$$

These methods are also helpful in calculating the inverse or generalized inverse of a matrix, but with modern computing power these methods have become somewhat obsolete.

See Also

► Operations Research

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Local Search

Riitta Katila and Sruthi Thatchenkery
Stanford University, Stanford, CA, USA

Abstract

The article opens with a discussion of local search as a process of problem-solving, highlighting how it tends to be adopted by firms that are experts in the current business environment, but may be resistant to change. The result of the adoption of such a strategy is that organizations will make incremental rather than revolutionary changes. Local search is seen to be a combination of a number of factors, such as environmental uncertainty and time and resource constraints. In this sense local search is seen to be more consistent with

more predictable outcomes than the process of distant search. However, it does have a lower level of variance than distant search and this will have implications for an organization in times of considerable environmental change.

Definition Local search is problem-solving that focuses only on the neighbourhood of what is already known, drawing on the pre-existing knowledge base and on how the problem (or similar problems) had been solved in the past. It will tend to be adopted by organizations that are expert at exploiting existing solutions, but often resistant to change.

Local search is problem-solving in the neighbourhood of what is already known. In local search, organizations use knowledge that is closely related to their pre-existing knowledge base and to how the problem was solved in the past (Helfat 1994; Katila and Ahuja 2002). Broadly defined, local search also includes problem-finding – that is, search for new but closely related problems to which a firm's existing knowledge might provide a solution (Maggitti et al. 2013). Organizations that primarily engage in local search are experts at exploiting existing solutions and adapting to the current environment, but they tend to resist change.

The origins of local search are found in human nature and the assumption that human attention span and rationality are limited. As a result, organizations typically favour local over more distant types of search, and, as Nelson and Winter (1982, pp. 9–10) describe, are 'much better at doing "more of the same" than they are at any other kind of change'. As a result, most of the time organizations evolve in incremental steps along an established trajectory (Utterback 1994).

There are multiple *drivers* for local search. First, local search is a natural response to environmental ambiguity, uncertainty and scarcity, such as cost or time pressures (Greve and Taylor 2000). This is because local knowledge is salient, easy to access and cost-efficient to use. Second, formalization of the organization such as adoption of process management practices (Benner and Tushman 2002) drives local search. This is because formalization favours reliability and standardization that typically emerge as a result of local (rather than distant) search. Third, research has noted that shared work histories of founders and top executives, or repeat relationships with the same partners, introduce a set of beliefs, or a 'dominant logic' (Beckman 2006), that is likely to fuel local search.

Significant *outcomes* of local search include the potential inability of organizations to change. Local search typically encompasses behaviours that increase the mean of organizational activity. As a result, the returns to local search are more reliable and the outcomes more predictable than those of ▶ distant search. But local search kills variance. The classic paper by James March (1991) drew the research field's attention to such risks again by noting that over-emphasis on local search may drive out distant search. Empirical research has corroborated these variance-reducing effects of local search on innovation (especially new products), market expansion, performance and firm growth (e.g., Katila and Chen 2008).

Much organizations and strategy research has conceptualized local search in a technology space, that is, in the landscape of technological possibilities. In such technology landscapes, search is local when it focuses on closely related technologies; for example, if it repeatedly uses and builds off of the same patented technologies (Katila and Ahuja 2002). Other research has used the concept of local search (and the related quest to break away from it) in relation to geographies (Rosenkopf and Almeida 2003), time (Katila 2002), acquisitions (Karim and Mitchell 2000) and organizational designs (Levinthal 1997).

Current and future *research directions* include rethinking how 'localness' is defined. Some have suggested that a more relevant conceptualization of localness is comparison to other firms, that is, similarity to what others in the industry know (Katila and Chen 2008). Another research direction that has gained momentum is to better understand the relationships between local search, search intensity and search expertise (Li et al. 2013). As Katila and Ahuja (2002, p. 1184) note, 'The search efforts of firms can vary not just in their scope (local versus distant)

but also in their depth, which is the degree to which existing knowledge is reused or exploited.' The idea that there are different degrees of depth in the firm's local search and knowledge, opens up opportunities to rethink the value of local search, and potentially differentiate it from the related concept of exploitation. Finally, a view of search as a sequential process has emerged where local search is seen as a stepping stone for more distant searches, especially for entrepreneurial firms (Katila et al. 2012).

See Also

- ▶ Distant Search
- ▶ Organizational Learning
- ▶ Strategic Learning

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Lock-In Effects

Edward F. Sherry
Berkeley Research Group, Emeryville, CA, USA

Definition Lock-in effects occur when an individual, firm or group makes a decision to pursue a course of action only to discover subsequently that an alternative course would have been preferable. Because of the additional costs of switching at a later stage, it is 'locked in' to its original suboptimal course.

Lock-in occurs in situations in which it is costly to switch to an alternative course of action once an individual, firm or group has made a choice to pursue a particular course of action.

The term is sometimes reserved for situations in which, with hindsight, the individual, firm or group would have preferred to have chosen a different course of action had they known, at the time they made their initial choice, it would subsequently turn out that choosing a different course of action would have been preferable.

For example, consumers or firms may invest in buying and learning a particular computer operating system, only to subsequently discover that there is an alternative system more suited to their

needs. However, given the past investment in learning the operating system, acquiring hardware that runs that system and software packages that are written for that system, and creating files in that operating system, it may be costly to switch to an alternative.

One canonical example of lock-in is the QWERTY keyboard layout, which was originally adopted at a time when early typewriters had a tendency to jam if keys were struck too quickly after one another. The QWERTY layout slowed down touch-typists, reducing the amount of jamming and thus speeding up net typing speed. The original mechanical constraints that led to its adoption have long since disappeared, but the fact that generations of typists have learned to touch-type using the QWERTY layout, and the ubiquity of such keyboards, has made it difficult to coordinate a changeover to an alternative keyboard layout (such as the Dvorak keyboard) that promises increased typing speed.

This example demonstrates that lock-in can be especially significant in the face of network effects, in which any single individual's (or firm's) preferred choice depends on the extent to which others adopt similar choices.

Lock-in is unrelated to the presence of ▶ *sunk* costs (costs that have already been incurred and cannot be recouped should an alternative be adopted). Instead, lock-in is due to the presence of ▶ *switching* costs. The magnitude of switching costs, in turn, depends not only on the alternative being switched *away from* and the alternative being switched *to*, but also on the *time frame* over which the switch is proposed.

In this sense, lock-in is ubiquitous in many areas of the economy. Whenever an individual or firm makes an investment in a durable good, there is some degree of lock-in until that durable good wears out and needs replacement.

To some extent, concerns about lock-in can be addressed with the use of lifecycle costing, whereby buyers seek to predict the overall cost of a proposed alternative over its projected useful economic life. However, lifecycle costing may be difficult if future costs are hard to predict, whether because of unforeseen technological changes or because of unforeseen strategic choices by various market participants.

For example, once consumers have invested in particular durable goods such as photocopiers, the manufacturer may have an incentive to raise the price of service and replacement parts for such equipment, thereby increasing the cost of ownership above that originally foreseen. This sort of 'installed-base opportunism' can raise antitrust concerns. That said, rational consumers, aware of the incentives for manufacturers to engage in such opportunism, may take steps to protect themselves against being exploited in such a fashion, whether contractually or by discounting the price they are willing to pay up front for goods for which lock-in is seen to be an issue.

However, in many instances lock-in arises as a result of unforeseen technological change. The availability of new alternatives may lead firms or consumers, in hindsight, to regret their initial choices. One can, however, question the *policy* relevance of such hindsight-based concerns.

From a public policy perspective, the most significant concerns arise when incumbent suppliers take intentional technological, strategic or contractual steps to increase the degree of lock-in and thus not only increase their ability to engage in installed-base opportunism but also hinder or forestall competitive entry. For example, IBM was accused of intentionally making it difficult for purchasers of IBM mainframes to buy peripheral devices (such as tape drives) from non-IBM sources, by means of a 'connector conspiracy' (changing the designs of the connectors that connect such devices to the mainframes). Strategic initiatives such as customer loyalty programmes also make it costly for consumers to switch to alternative suppliers, thereby locking them in to their existing suppliers and making new entry more difficult.

See Also

- ▶ Innovation
- ▶ Sunk Costs
- ▶ Switching Costs
- ▶ Transaction Cost Economics

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Logic of Consequences and Logic of Appropriateness

Martin Schulz
University of British Columbia, Sauder School of Business, Vancouver, BC, Canada

Abstract

The two logics capture a fundamental distinction between two modes of action in organizations (and beyond). They essentially characterize the difference between deliberate and habitual action. The two logics play a central role in theories of bounded rationality and have been elaborated by the Carnegie School and a considerable number of social scientific paradigms. They provide the conceptual starting point for studies that aim to understand how cognitive mechanisms (in particular, their limitations) drive action. At the same time they represent archetypes of action that play an enormous role both in the real world and in prominent models of organizations, firms, markets, institutions, states and societies.

Definition

- Action follows a *logic of consequences* when it is driven by subjective assessments of outcomes of alternative courses of action.
- Action follows a *logic of appropriateness* when it is shaped by rules relevant to the current situation.
- A *logic of action* is a characterization of a mode of action of an actor (individual and collective). It aims to capture the 'reason to act'. Action can be seen as programmed by a logic when it is connected to (or 'orientiert an' – to use Weber's expression) expectations (ranging from tacit to explicit, from realistic to quixotic) about the current course of action or its outcomes.

Logic of consequences (LoC) and logic of appropriateness (LoA) are influential concepts in organization studies. The two concepts characterize the logics of action of imperfectly rational actors (e.g., individuals, groups, organizations) and thereby can help to understand and predict their behaviour. At the same time, the two logics provide the building blocks for new theories of action in organizations that transcend the narrow neoclassical frame of fully rational and utility-maximizing action. Conceptions of LoA and LoC have varied over time and authors/students; this article is anchored in original formulations of the Carnegie School (in particular, Simon 1955, 1976, 1978, 1996, 1999; March 1978, 1982; Cyert and March 1992; March and Simon 1993).

A logic of consequences guides what we normally consider to be 'analysis-based' action (March and Simon 1993: 7), which normally comprises deliberate consideration of alternatives, assessment of their outcomes and preference-driven choices. Its key feature is the presence of calculated choice between alternatives. Actors driven by a LoC engage in some form of (imperfect) analysis to evaluate future consequences of their decisions. Action following a LoC thus involves a notable (but ultimately bounded) degree of information processing. This can make it dependent on scarce cognitive capacities of actors, and generate prominent forms of imperfectly rational action such as satisficing (Simon 1955), sequential attention to goals (Cyert and March 1992) or myopic learning (Levinthal and March 1993).

A logic of appropriateness governs what could perhaps better be called 'rule-based' (or 'recognition-based') action (March and Simon 1993: 8), following a path that is guided by *rules*. Rules are relatively fixed responses to defined situations. The notion of rules is broad and includes both tacit and explicit forms of action programming, such as intuition, roles, habits,

skills, routines, capabilities, experience, knowledge, conventions, policies, bureaucratic rules, norms, laws, institutions and technologies. 'Guided by rules' can take on a fairly wide range of meanings, such as automatically following a familiar routine, neurotically conforming to a norm, diligently obeying a new law, generously fulfilling an obligation, casually observing a custom, using motor skills (to swim, bike, walk, type, speak and so on), blindly following an order or stubbornly clinging to a superstitious ritual. The rules can originate from prior actions of the actor (e.g., priming, precedent, drill) or of other actors (e.g., in cases of mimesis, imitation). Appropriateness' of the LoA does not primarily refer to moral or aesthetical appropriateness; rather, the key feature of the LoA is a matching of rules to situations. Actors recognize a situation and connect it to appropriate action consistent with relevant rules (often anchored in the identities of the actors; March 1982). Because LoA relies on the matching of (signals about) situations to rules, it can be considered as a 'recognition-based' logic of action (March and Simon 1993: 8). The underlying cognitive processes are often based on intuition, and this can enable rapid response actions. But, as intuition-based action, LoA is inherently inaccurate and recognition errors can lead to spectacular accidents (e.g., Gersick and Hackman 1990). Compared with the LoC, the LoA involves less information processing and this can entail potent benefits; for example, due to routinization, specialization, simplification, knowledge reuse, absorption and imitation.

LoA and LoC are fundamental components of all meaningful action. Action without either logic is random and appears senseless (without 'rhyme or reason'), while action shaped by the logics takes on direction and meaning. In principle, LoA and LoC are available for every action; they span the entire space of meaningful action. Action can follow predominantly one or the other logic, and is often a mix of both. The relationship between the logics and action is multifaceted and has epistemological and practical implications: (i) The *attribution* of an action to a logic can be either subjective or objective. Each logic can be imputed by an observer (researcher) or the actor (on itself and others, intuitively or deliberately). (ii) *Shifts* between logics are common and are at the heart of powerful organizational mechanisms discussed below. (iii) The analytical power of the two logics derives from the illuminating *comparisons* that they offer. Comparisons between a LoA and LoC version of the same action can reveal crucial differences, such as routine versus non-routine phone calls, mindless versus mindful cost-cutting or the automatic versus deliberate entry into a military conflict (e.g., Allison 1971; March 1994).

It is easy to misunderstand or overextend the two logics of action. For that reason it is important to keep in mind that LoA and LoC are both logics of imperfect rationality that differ from the neoclassical logic of perfect (omniscient) rationality (LoP), which conceives action as fully rational and utility-maximizing. Although LoP could be construed as a limit towards which LoC converges as constraints to rationality are removed, the construction (e.g., shifting assumptions and action from satisficing to maximizing) is likely to lead to unrealistic scenarios, comparable to 'counting the angels on the heads of neoclassical pins' (Simon 1999: 113). The LoA-LoC distinction opens the door to perplexing worlds of organizations built from plausible assumptions about imperfectly rational action, actors and outcomes. The two Carnegie logics provide a unifying framework of bounded rationality that can facilitate the development of powerful, realistic and relatively parsimonious explanations of the emergence of stable patterns of action (including individual, organizational, economic, social, political and legal action) and their evolution over time.

The LoA-LoC distinction has served as a wellspring of innovation in the social and organization sciences. It has been extended into many directions and invites intriguing comparisons with extant dichotomies. Given the intellectual appeal and central position of the two logics, it might be prudent to be aware of notable pitfalls that can (and tend to) occur when the logics are too hastily extended into new directions or connected to (or reduced to) other theories, conceptions and dichotomies. Thus, a few caveats are in order.

- *Persistence and shifts in logics*. Some efforts have extended the two logics to characterize institutions and fields (Alford and Friedland 1985; DiMaggio 1991), 'value spheres' (Townley 2002), industries (Thornton and Ocasio 1999; Thornton 2002), nation states (Hicks 1995) or political orders (March and Olsen 1989, 2006; Olsen and March 2004). Such extensions can be instructive, but often make strong assumptions about the persistence of the logics in a given course of action (and have met with a fair amount of scepticism, e.g., Sending 2002; Goldmann 2005). Although the logics could be seen as 'explanations' of actions of actors (in the sense of observers attributing reasons to action), they – by themselves – do not imply persistence of a given logic. Action can travel along paths that can be seen as following sometimes one logic and another at other times. Shifts happen between LoA and LoC, but can also happen within each; for example, when situations unfold and different rules become relevant or when the analysis of alternatives reveals new needs. Shifts come in all shapes and forms, from gradual to radical and accidental to predictable. The key insight here is that the logics are of limited use for prediction unless we understand the persistence of logics and shifts between them. Clearly, we would expect shifts to be path-dependent: persistence of logics and shifts between them are phenomena that follow their own rhythms as action unfolds and runs into familiar and unfamiliar situations. However, the specific mechanisms that produce and prevent shifts and render them path-dependent for a given domain need to be articulated, and this is where extensions of the logics often struggle.
- *Normative conceptions*. Other extensions appear to drive the distinction between LoA and LoC into normative terrain. They are unlikely to succeed as, a priori, there is nothing that allows us to award moral superiority to one or the other (nor is there a justification for the imposition of order linked capriciously to one or the other logic). Ensuing controversies (e.g., Goldmann 2005) have all too casually equated the LoA-LoC distinction with altruism and opportunism, and tend to neglect that both (altruism and opportunism) can be deliberate and habitual (as are the actions of criminals and saints). Although perhaps empirically correlated in some contexts, self-interest is analytically separable from the two logics (as is the presumption of a clear and stable 'self').
- *Subsumesmanship*. Each logic has been construed as a special case of the other. Proponents of institutions and cultures tend to regard rational choice as a special case of following appropriate rules (about behaving and appearing 'rationally'). Advocates of rational choice and realpolitik tend to regard rule-following as a form of voluntary submission to rules rationally agreed to. Such reductions can help to illuminate limiting cases, but they ignore the archetypical nature of the two logics and overlook the fact that rationalization of habit and routinization of choice fail to do justice to either logic.
- *Institutional logics*. Barring subsumesmanship, the LoC-LoA distinction cannot be reduced to a special case of 'institutional logics', a notion that has assumed increasingly dominance in institutional thinking (Thornton and Ocasio 1999; Thornton 2002; Lounsbury 2007). From the perspective of this article, all institutional logics are proper subsets of LoA. Moreover, the fundamental nature of the distinction between LoC and LoA does *not* extend to distinctions between different institutional logics – they face their own challenges of drawing and stabilizing categorical boundaries (e.g., Rao et al. 2005). Likewise, the degree to which institutional logics 'compete' with each other in a given situation (and how they compete) is a priori unclear, while the coexistence of institutional logics appears to be a common situation (e.g., Hinings 2012).

Understanding these caveats and avoiding related pitfalls might not be easy, but can be facilitated by returning to the cognitive roots of the LoA-LoC distinction and recognizing how the logics differ in terms of information-processing mechanisms. The following subsections take

information processing as the theoretical backbone to draw clearer distinctions between the two logics, and to analyse shifts between them.

Information Processing and Logics

Conceptually and empirically, the two logics involve different levels of information processing. They arise from the Carnegie School's focus on information processing and limited rationality. The underlying assumption was that cognitive limitations shape the information processing of actors (individuals, groups, organizations) and thereby introduce characteristic biases into their decision-making and behaviour. From that perspective, different types of action – logics – could be identified, which involve different levels and mechanisms of information processing.

Information-processing levels are inherently lower for LoA than for LoC. LoA resides at the '"routinized" end of the continuum, where a stimulus calls forth a performance program almost instantaneously' (March and Simon 1993: 160), 'with little or no hesitation' (Simon 1976: 89). In contrast, LoC resides at the non-routine end, where 'a period of hesitation' precedes choice (p. 89). It describes a '"startle pattern" of behavior' (p. 90) in which 'a stimulus evokes a larger or smaller amount of problem-solving activity', characterized by 'search aimed at discovering alternatives of action or consequences of action' (March and Simon 1993: 160).

While the two logics differ principally in the terms of the level of information processing involved, the difference is neither absolute nor fixed. Within each logic, levels of information processing can vary, sometimes considerably. Some forms of LoA-based action can involve a significant degree of analysis for the classification of situations and retrieval of experiences (e.g., matching fingerprints in a database), and thus can require relatively high levels of information processing (March and Simon 1993: 8–13) or 'mindfulness' (Levinthal and Rerup 2006). Conversely, LoC-based action is greatly simplified by search and analysis routines (e.g., by data analysis skills), and it can involve the deliberate adoption of assumptions and rules that shape subsequent action. In practice, most situations involve a mix of both logics, although these situations might be characterized more by one than the other.

The existence of such mixed cases does not mean that the distinction between the two logics is invalid (as some have suggested, e.g., Goldmann 2005). Converting a LoA situation into a LoC situation would require the addition of analytical steps typical for consequential action, such as search aimed at discovering alternatives of action, assessment of their outcomes, preference-driven choices and learning to avoid mistakes. Conversely, converting a LoC situation into a LoA situation would mean replacing consequential analysis with some form of performance programming typical for rule-based action, such as the intuitive matching of rules to the situation, and their automatic (and often mindless) adoption and application. It turns out that such conversions have practical and theoretical relevance associated with real-world shifts in logics.

Shifts in Logics

Logics of action can shift naturally when elements characterizing the opposite logic become prominent in a given situation. Such shifts can be induced by a number of factors (accidentally or intentionally, exogenously or endogenously), but they can alter the character of the situation radically (e.g., from 'new' to 'familiar' or in the reverse direction, e.g., after a car crash) and can switch action into a different gear, with different information-processing requirements and sometimes with dramatic differences in the level of information processing involved.

Powerful efficiencies can arise when action shifts in logic from LoC to LoA (and they can be – but do not need to be – the motivator for the switch). The shift occurs typically in the course of routinization (e.g., Becker 2008; Schulz 2008); a new path of action is carved by an actor reacting to a new situation, and subsequent encounters with that situation (or similar situations) require less

cognitive resources. The efficiencies of routinization arise from developing and retaining solutions to familiar situations. On the individual level, '(h)abit permits conservation of mental effort by withdrawing from the area of conscious thought those aspects of the situation that are repetitive' (Simon 1976: 88). On the organizational level, when 'methods of handling recurring questions become matters of organization practice, perhaps embodied in manuals of practice and procedure, they cease to be objects of reconsideration when these questions arise' (p. 88). Decision premises, established through consequential analysis on a given level at a given time, inconspicuously influence (e.g., guide, legitimate, trigger or set the context for) subsequent decisions and action on the same or other (e.g., subordinate) levels (Simon 1976), and can lead to the formation of elaborate (yet imperfect) decision trees, routines and grammars (March and Simon 1993; Pentland and Rueter 1994). ► organizational learning curves (e.g., Argote and Epple 1990; Schulz 2001a) in effect capture the returns of a gradual transition from LoC to LoA. Likewise, related economies of specialization arise from developing deep pockets of expertise and elaborating organizational rules and routines relevant to recurrent tasks and problems (Levitt and March 1988). A shift from LoC to LoA is also a characteristic ingredient in institutionalization. In fact, contemporary institutional theory highlights the important role cognition plays for institutionalization and regards cognition as one of its pillars.

The reverse shift, from LoA to LoC, is associated with an increase of information processing and tends to occur when new situations arise that cannot be easily be matched to existing rules (e.g., when rules have uncertain relevance to a given situation, contradict each other or produce unexpected outcomes), and thereby induce a moment of reflection on alternative future courses of action and their consequences. The increase in information processing can be massive (e.g., when it involves re-establishing a new political equilibrium in multi-actor settings), and can lead to undesirable outcomes (due to the withdrawal of information-processing resources from other places, e.g., texting while driving). The onset of consequential reflection often occurs in response to performance shortfalls. When performance gaps are seen as problems, they can induce 'problemistic search' (Cyert and March 1992) and thereby intensify risky organizational changes (Greve 2003a, b), and when paired with adaptive aspiration levels, can produce patterns of convergence and reorientation (Lant and Mezias 1992). Shifts from LoA to LoC have important implications for organizations and their performance. Studies of such shifts have explored several problem-related processes, notably these: (i) On the organizational level, a shift from LoA to LoC often leads into *garbage can decision-making* situations in which problems are looking for solutions, solutions for problems, and both for actors with interest and sufficient access to make decisions happen. (ii) When rules – necessarily imperfect due to the bounded rationality of rule makers – run into problems, they can become the focus of rule-change efforts and thereby produce *path-dependent patterns of rule births*, *revisions and suspensions* that have been explored by the Dynamics of Rules branch of the Carnegie School (e.g., March et al. 2000; Schultz 2003b). (iii) Subunit-level exposure to new situations and problems (e.g., in the local market of the subsidiary of a multinational corporation) can produce new (or revised) organizational knowledge (technologies, capabilities, rules) and stimulate knowledge flows to central subunits (Schulz 2001b, 2003a) and (myopic) consequential analysis (Gavetti 2005), aiding the discovery of new knowledge combinations and applications.

Alternating between the two logics is itself associated with powerful outcomes. The capability to switch between logics – in response to rapidly changing environments – is central to the dynamic capabilities of firms. They facilitate formation, adjustment and renewal of firm-specific routines and capabilities and thereby can lead to strategic advantage and success (Nelson and Winter 1982; Teece et al. 1997; Zollo and Winter 2002). Related, knowledge-based approaches of the firm stress organizational structures and processes that are capable of establishing and reshaping organizational resources (Teece 2000). Likewise, popular approaches to knowledge creation suggest

that translating knowledge between explicit (LoC-related) and tacit (LoA-related) forms contributes to organizational knowledge production and recombination (e.g., Nonaka 1994).

Conclusion and Outlook

The LoA and LoC distinction marks two fundamental modes of action, one guided by imprints of prior action and the other driven by considerations of future alternatives. As a conceptual starting point for several divergent theoretical developments in the social sciences, the LoA-LoC distinction inhabits constructive tensions, invites intriguing comparisons and provokes inspiring controversies. Some debates have extended the logics into new terrain with unclear connections to the original, cognition-based conceptualization. At this point, the returns from such explorations are not always clear, but some of their struggles appear to be manageable (some even avoidable) by paying closer attention to the different forms and levels of information processing involved in each logic as well as the mechanisms that induce and prevent shifts between logics.

The central thesis of this article is that action can travel along paths that can be seen as following sometimes one logic and sometimes another logic. Although shifts between logics have deep implications, the mechanisms that induce and prevent them are often given too little attention in discourses on the logics and their extensions. To make them more useful as predictive tools, we need to better understand the persistence of the logics and shifts between them. And this means that we need to better understand variations in the persistence of rules and rule-following, and of preferences and consequential analysis. It seems the path ahead is challenging but holds considerable promise for deepening our understanding of the evolution of imperfectly rational social order.

See Also

- ▶ Bureaucracy
- ▶ March, James G. (Born 1928)
- ▶ Organizational Learning
- ▶ Organizational Memory
- ▶ Organizational Routines
- ▶ Simon, Herbert A. (1916–2001)

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Logical Incrementalism

John C. Camillus
University of Pittsburgh, Pittsburgh, PA, USA

Abstract

Organizations employ the process of logical incrementalism because it is more practical and responsive to the complexity and uncertainty inherent in strategic challenges. Logical incrementalism adapts the pragmatic and functional elements of traditional, formal analytical processes, as well as processes that recognize and manage the power and psychological shifts inherent in strategic change. It responds to the reality of bounded rationality and embraces the power and pragmatism of the 'science of muddling through'. Logical incrementalism inherently employs a ▶ real options mindset that is well suited to cope with the extreme complexity, great uncertainty and increasingly 'wicked' nature of strategic issues.

Definition Logical incrementalism is a normative approach to strategic planning in organizations that combine elements of the classic, formal strategic planning process with the power-behavioural perspective; it also embeds the emergent processes of strategy formation that have been observed in organizations. It envisages organizational subsystems, taking discrete and independent steps in response to internal and external developments, and is informed to some degree by a grand vision of the organization's goals.

The term 'logical incrementalism' was coined and popularized by ▶ James Brian Quinn (1978) with a key article and a later, definitive book (1980). Based on observations of the practice of ▶ strategic planning in organizations, Quinn (1978) argued that the classic normative approach (Ansoff 1965; Steiner 1969; Andrews 1971; Lorange and Vancil 1977) to strategic planning, which specifies detailed external and internal analyses leading to the development of the organization's strategy, is not what organizations actually employ. Nor is the power-behavioural approach (Cyert and March 1963; Bower and Doz 1979) fully adopted. Logical incrementalism cobbles together, purposefully as well as organically, elements of both formal, synoptic planning and the power-behavioural approaches to decision-making.

Roots of 'Incrementalism'

Logical incrementalism's theoretical underpinnings can be traced to Lindblom's (1959) seminal work on the 'science of muddling through'. Lindblom's basic proposition – that incremental actions, which appear to be acceptable to stakeholders or feasible in terms of implementation, combine over time to form a strategy – are at the heart of logical incrementalism. The *incremental aspect* of the process is realized, according to Quinn (1978), by discrete subsystems within the organization that make decisions that are responsive to real-time external and internal developments and perceived issues. These subsystems include those for diversification, divestiture, major reorganization and government/external relations.

Incrementalism responds to the reality of 'bounded rationality' (Simon 1947, 1957). Bounded rationality recognizes that the comprehensive, synoptic and analytical decision process that is presumed to exist in the classic strategic planning paradigm is impractical and unrealistic in the context of the complexities and uncertainties that cloud strategic issues. The real-time emergence of strategy – through the processes of 'crafting' described by Mintzberg (1987) or 'adaptation' proposed by Chakravarthy (1982) – is akin to the incremental process described by Quinn (1978, 1980).

Roots of 'Logic'

The *logical aspect* of Quinn's process derives from incorporated elements of classic formal planning that give rise to goals, evaluation criteria and frameworks that guide and integrate short-term, incremental actions and decisions. Formal planning processes are embedded in the management systems of most organizations.

These formal processes ensure that managers periodically assess the future so that emerging issues are identified and analysed, and organizational goals are refined and systematically and comprehensively communicated. Organizational goals can be expressed as a vision or as ▶ strategic intent (Hamel and Prahalad 1989). A common understanding of the future can also emerge from these processes, which promotes consistency in short-term decision-making across all the organization's subsystems.

Integrating Logic and Incrementalism

Logical incrementalism draws strength from elements of classic formal planning, adopts essential aspects of power-behavioural processes and embraces Lindblom's (1959) action-to-strategy sequence. Camillus (1982) proposes an approach that interlaces episodic, formal, synoptic planning efforts with ongoing incremental processes that

are responsive to developments as they happen or are perceived to emerge.

Incrementalism that is bereft of the logic drawn from formal analytical exercises and the harmony in decision-making resulting from shared philosophies, perspectives and broad goals emerging from such formal planning exercises would be ineffective. However, logic alone is inadequate to deal with shifts in power and levels of complexity and uncertainty that create unpredictable and even unknowable futures. Emergent (Mintzberg 1985) and crafted (Mintzberg 1987) strategies are better suited to cope with extreme uncertainty and complexity than are formal deliberate strategies.

By adopting what is practical and helpful from these disparate planning processes (Brews and Hunt 1999) logical incrementalism takes on characteristics that respond to the challenges of highly complex and uncertain business contexts.

Responsiveness to Complexity and Uncertainty

Logical incrementalism as a planning process implicitly adopts a real-options (Miller and Waller 2003) approach. It enables organizations to reserve the right to play – to adopt a flexible stance, minimizing irreversible investments until information is obtained that reduces uncertainty to the point where major resource commitments can be made with an acceptable level of risk. The real-options approach is well suited to deal with futures that are not only unpredictable but unknowable.

The taxonomy of four kinds of uncertainty faced by managers that is proposed by Courtney et al. (1997) provides a lens through which to assess the relevance and power of logical incrementalism. Where the future is substantially predictable, the classic, formal synoptic processes of planning may serve organizations well. Even in this context of (1) predictable futures, the responsiveness of logical incrementalism to the different priorities of organizational subsystems may enhance the viability of strategies adopted by the organization by acknowledging and managing the power and psychological shifts concomitant with strategic change.

Where the nature of uncertainty being faced is that (2) multiple alternative futures are possible or where the future holds (3) an enormously wide range of possibilities, the real-options approach – flexibly reserving the right to play until clarifying information becomes available – that is intrinsic to logical incrementalism is an effective response. In the context of (4) total ambiguity, a future that is unknowable and not amenable to description, the purposive branch to root, 'muddling through' (Lindblom 1959) that is enabled by logical incrementalism offers the possibility of superior outcomes for the organization.

The extreme complexity and great uncertainty that increasingly characterize strategic issues and which give rise to 'wicked problems' (Camillus 2008) are not effectively addressed by traditional analytical processes or power-behavioural processes. The real-options, realtime, continuously evolving yet goal-driven nature of logical incrementalism offers organizations a planning paradigm that is better able to cope with these difficult strategic challenges.

See Also

- ▶ Emergent Strategy
- ▶ Muddling-Through Theory
- ▶ Real Options
- ▶ Simon, Herbert A. (1916–2001)
- ▶ Strategic Intent
- ▶ Strategic Planning

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Loss Leadership

Brian M. Saxton and Jay B. Barney
Ohio State University, Fisher College of Business, Columbus, OH, USA

Abstract

Loss leadership is a marketing strategy in which retailers sell items for unusually low prices to induce customers to buy other goods at normal profits. While the phenomenon and its efficacy have received relatively little scholarly attention, the existing evidence suggests that it can be a viable means of achieving price discrimination as well as increasing store traffic. It is related to, but distinct from, the 'razors-and-blades' strategy of selling one good at a low price to encourage sales of complementary goods.

Definition A loss-leader strategy is one in which retailers sell items for unusually low prices, sometimes below cost, to induce customers to buy other goods at normal profit margins. The merchant hopes to recover the forgone revenue from the loss-leader items through higher volume on the rest of their offerings.

Loss leadership is a marketing strategy in which 'retailers set very low prices, sometimes below cost, for some products to lure customers into stores' (Hess and Gerstner 1987: 358). Research has investigated several potential reasons why this strategy might be successful, but conventionally it is done so that consumers buy other goods that generate higher profits. It is similar to, but distinct from, the so-called 'razors-and-blades' strategy, in which firms sell one good at a low price in order to encourage sales of a complementary good (Picker 2011).

Potential Benefits of a Loss-Leader Strategy

A loss-leadership strategy might be employed for several reasons: to encourage consumers to purchase other goods (Hess and Gerstner 1987), to economize on advertising costs (Lal and Matutes 1994), to take advantage of differing consumer propensities to buy from the lowest-price sellers (Nagle and Novak 1988; Simester 1997) or to encourage purchases from more profitable customers (DeGraba 2006). All of these rationales can hold under specific conditions, thus making loss leadership a potentially profit-increasing strategy.

While research on loss-leader strategies is relatively scarce, several studies have investigated

the practice. Hess and Gerstner (1987) model a situation where customers choose between stores which feature particular items at loss-leader prices and stores that do not; in their study, firms offer 'rain checks' that entitle consumers to obtain the sale price on the featured item even if it is out of stock. This was a live issue, because at the time the Federal Trade Commission (FTC) had a rule that stores must maintain sufficient stock on sale items such that all consumers could obtain them. Hess and Gerstner found that loss leaders tend to increase profits, whether or not consumers make impulse purchases along with the sale items.

By contrast with Hess and Gerstner, who used a formal model, Walters and MacKenzie (1988) gathered data on pricing and sales in two different outlets of a chain grocery store over a 30-month period. As part of a larger study of the effects of pricing and promotional policies, Walters and MacKenzie found that loss-leader pricing in most cases had no ultimate effect on store profits. To the extent that it did matter, it did so because it increased store traffic, not because it increased sales on loss-leader items. They found no evidence that loss-leader promotions increased purchases of complementary items, as received theory suggested they would.

This issue of advertising costs was further investigated by Lal and Matutes (1994). They modelled a situation where consumers were uninformed about prices unless stores advertised them, and then decided which stores to visit based on their expectations about advertised and non-advertised prices at the various stores. Through introducing this lack of information on the part of consumers, Lal and Matutes developed a rationale for loss-leader pricing that does not depend on increases in store traffic or ultimate profits. They suggest that the advantages of loss-leader pricing relate to establishing price expectations on the part of consumers, and thus occur in equilibrium without increases in store traffic or profits occurring as a result. Since this loss-leader strategy carries with it the risk that consumers will stockpile loss-leader items, this analysis suggests that firms should promote items that are relatively perishable.

Simester (1997) and Nagle and Novak (1988) suggest still another rationale for using loss-leader items: that firms use them to compete for relatively price-sensitive shoppers. In Simester's model and Nagle and Novak's empirical research, they both find evidence that loss-leader items are those that are most likely to be purchased by price-sensitive consumers. More recent work by DeGraba (2006), also based on formal modelling, tests the idea that firms use loss leaders because it enables them to offer lower prices to higher-volume consumers. One example of this phenomenon might be that firms would discount turkeys before Thanksgiving because consumers seeking to buy turkeys are preparing dinner for large groups, and so will be purchasing more than other consumers. In this conceptualization, the loss leader is a form of volume discounting.

From the above discussion, it is clear that while a number of studies have investigated issues around loss-leader pricing using formal modelling, few have done so empirically. As such, it is difficult to tell which of the modelled effects is most important in practice. The circumstances under which the varying assumptions relating to consumer behaviour (including issues like price sensitivity, transportation costs, brand and store loyalty, and others) hold is also unclear. For example, the concept that loss leaders might change the expectation of consumers about prices at a particular outlet is of particular interest. Loss leaders might represent a way to establish a reputation for low prices in the minds of consumers that will increase traffic in the future. Empirical investigation into these areas would help answer these open questions.

The 'Razors-and-Blades' Model

Named after the famous example of Gillette deciding to sell razors cheaply in order to increase profits on blades, the notion of selling products relatively inexpensively in order to increase sales of consumables is a well-established business model (Teece 2010) in industries including consumer goods, electronics and jet aircraft. It is distinguished from loss leadership in that the

complementary relationship between the two goods is more specific in the razor-and-blades model, and it is a relatively permanent strategic decision as compared with loss-leader strategies which may shift from day to day.

While the razors-and-blades model is named after Gillette and its supposed strategy of selling razors at low prices in order to encourage the sale of blades, it is not clear that Gillette ever actually pursued such a business model. Gillette priced razor handles at the relatively high (compared to alternatives) price of $5 during the time that it had the ability to lock consumers into using its blades with its handles (until its patents on the product expired in 1921) (Picker 2011). This may have been because the key factors that enable such a business model were not really present for Gillette. Such a model makes sense where complementary sales are highly profitable (Noble and Gruca 1999) and where consumers face switching costs to change the base product. For example, consumers who own an Xbox video game system along with a library of games will lose their library if they decide to switch to an alternative such as a PlayStation 3. This was also the case for Polaroid's 'swinger' model of instant camera before the advent of digital photography: since consumers could not take instant pictures without it, the cost of switching away from the camera and film combination was high (Tripsas and Gavetti 2000). In Gillette's case, the availability of alternative shaving methods limited Gillette's profits on blades and consumer switching costs (Picker 2011), and, accordingly, the evidence suggests that they did not in fact discount razor handles while it would have made the most sense for them to do so (that is, while their patents were in effect).

'Freemium' Pricing

Another similar pricing strategy, common in the information technology industry, is 'freemium' pricing, or offering a basic package of services for nothing, supplemented by premium value-added offerings at higher prices. This is used by software companies which offer enhanced versions of open source software, as well as firms such as Adobe, Skype and Dropbox, who are attempting to leverage their large user bases by charging for upgrades to their commonly used free software (Teece 2010). While this model is increasingly widely used, its ultimate sustainability is unclear.

See Also

- ▶ Business-to-Consumer (B2C) Marketing
- ▶ Marginal-Cost Pricing
- ▶ Market Price
- ▶ Price Discrimination

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