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Transaction Cost Levelling to Reduce Incumbent's Difficulty in Innovation: A Heuristic Approach through Critical Review

K.G. SATHEESH KUMAR
Asian School of Business, India

AMALENDU JYOTISHI
Amrita University, Bangalore, India
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ABSTRACT Research on incumbent's difficulty in innovation has evolved around frameworks for identifying disruptive, architectural or discontinuous innovation, although it is widely acknowledged that incumbent's difficulty lies elsewhere, in financial evaluation and resource allocation. We propose an approach, based on transaction cost, to reduce incumbent's difficulty. We view that incumbents see a differential transaction cost between sustaining and disruptive choices of innovation due to the depressed transaction cost associated with the former and high transaction cost associated with the latter. For a new entrant the differential cost is absent or minimal. We propose, with five postulates, that incumbents should level their transaction costs for different innovation options. These postulates provide useful insights not only regarding the differences between innovation options available to an incumbent, but also about possible vulnerability to disruption. A few methods are suggested to achieve transaction cost levelling. The paper also identifies several opportunities for further research.

Keywords: Transaction cost levelling; Innovator's dilemma; Disruptive innovation; Incumbent's failure

Introduction

The difficulty faced by established companies to initiate certain kinds of technological or market innovations has been studied by many scholars (Foster 1986; Tushman and Anderson 1986; Henderson and Clark 1990; Christensen and Bower 1996; Hill and Rothaermel 2003; Macher and Richman 2004; Christensen et al. 2008). Researchers have termed such innovations as radical, discontinuous, architectural, or disruptive and the difficulty as "*failure of established firms*" (Henderson and Clark 1990), "*incumbent's curse*" (Chandy and Ellis 2000), "*innovator's dilemma*" (Christensen 1997), and so on. In this paper, we use the term incumbent's difficulty to describe the difficulty or dilemma experienced by established firms in as-

sessing the future potential of innovations which are of a breakthrough nature, variously described as radical, discontinuous, architectural, or disruptive innovations, and in realising such innovations.

Models and frameworks have been prescribed to identify and respond to such innovations (Charitou and Markides 2003; Christensen 2003), but with little predictive success (Danneels 2004). Ex-ante identification of disruptive technology by graphing its trajectory was suggested by Bower and Christensen (1995), but till it is too late or the new technology has grown to a certain level, it is nearly impossible to make such projection. Again, if the issue were the ability to predict or exploit the potential of a new technology, incumbents would score over entrants, as many disruptive technologies originated inside established firms, whose resources and competences were often superior to that of new entrants (Chandy and Ellis 2000; Burgelman et al. 2004). The issue is more related to willingness to invest than competence (Christensen and Bower 1996). Walters (2009) quotes Christensen, "*the common methods of financial analysis systematically bias managers against innovation*." Christensen et al. (2008) suggest that incumbents should be able to analyse options the same way as new entrants do. Incumbents, however, may not be able to do so, given their preference for sustaining innovation, relative to disruptive innovation. Their level of comfort, certainty, knowledge, and competence associated with the former will be higher than that related to the latter. New entrants, on the other hand, will be indifferent between the two, and may even find a less opposed path in disruptive innovation due to lack of competition from mainstream players. Accordingly, more than models that help predict disruption; incumbents need approaches that remove their disadvantage in analysing options. Extant research seems to have neglected this aspect. We attempt to address this gap through an alternative approach based of Transaction Cost Economics (TCE).

In the next section, we outline this alternative approach, which we call, "Transaction Cost Levelling". In the subsequent sections, we elaborate on the phenomenon of incumbent's difficulty, provide an overview of the TCE and proceed to apply TCE to the innovation choices. We present five postulates and conclude our discussions along with suggestions for further research.

Transaction Cost Levelling

Transaction cost levelling is based on Transaction Cost Economics (Coase 1937; Williamson 1981; North 1991, 1994, 1996). We define transaction cost levelling (TCL) as the process of minimising the difference in transaction costs between different innovation-options available to a firm. Our line of argument is that incumbents analyse innovation options differently because of their differential transaction costs related to such options. Such differences are absent or minimal for a new entrant, who, unlike established players, does not have prior entrenchments or investments in the resources, capabilities, assets, or markets, related to any particular innovation option in preference to another. Differential transaction costs arise from two sources – the lowered or depressed transaction costs associated with entrenched choices like incremental innovation or sustaining innovation, creating a low reference level, and the high transaction costs associated with new options suggested by architectural, disruptive or radical innovation. To reduce the incumbent's difficulty, this differential needs to be minimised and the two transaction costs made comparable. We do this through a two-fold approach. First, incumbents shall avoid too much depression in reference transaction costs or account for the depressed transaction costs while performing financial evaluation. An incumbent's en-

trenched performance trajectory (Bower and Christensen 1995), embedded architectural knowledge (Henderson and Clark 1990), and close linkages with suppliers, partners and customers are some of the reasons for such depression in transaction costs. Second, industry or professional organizations, governments, and multilateral bodies concerned with economic growth and innovation may create institutional arrangements like standards, conventions, protocols, industrial clusters, effective appropriability regimes (Teece 1986) etc., that reduce the risk, uncertainty, information asymmetries, investment requirements, and intellectual property issues related to a new or disruptive innovation, thereby reducing associated transaction costs. Firms can also reduce the transaction costs of disruptive innovation by pro-active exploration. Once the transaction costs of the innovation choices are levelled, established companies would be able to perform a better assessment of their opportunities, competences, capabilities, and complementary assets (Teece 1986, 2010; Chandy and Ellis 2000) to make the right choices.

The TCE-based approach contributes an important dimension to our understanding of the incumbent's problem and its solution. A firm's choice of an innovation option depends not only on its capabilities, but also on its willingness to pursue it. Incumbent firms often have the capability related to the market, product, and technology, but may not be willing to pursue disruptive options when the transaction costs associated with them are high compared to the depressed transaction costs they got used to, with established markets, products, and technologies. The two costs need to be made comparable to facilitate disruptive innovation by incumbents. Transaction Cost Levelling addresses this aspect by reducing the differential.

The Phenomenon: Incumbent's Difficulty

Abernathy and Utterback (1978) observed that companies focused on efficiency were good at incremental innovation, but not at radical innovation. A few years later, Tushman and Anderson (1986) showed that changes in the technological environment were incremental over long periods of time, but with occasional breakthroughs. Their research found that new entrants often initiated "*competence-destroying*" changes that disrupted industry structure, while incumbents initiated "*competence-enhancing*" changes that consolidated their market position. Consultants like Foster (1986) warned established companies that unless they initiated change, they were vulnerable to attacks by new entrants. Notwithstanding, most established companies, misled by past success and hubris, preferred to counter such attacks by resisting change and spending more on existing technology, only to ultimately lose market share.

Providing a deeper understanding of the phenomenon and its underlying drivers, Henderson and Clark (1990) proposed a framework, classifying innovation along two dimensions – core concepts (components) and linkages between core concepts (architecture). Either dimension could be existing or new. When innovation was based on existing component and architecture, it was termed incremental. Firms met the needs of current customers mostly this way and hence it was also termed sustaining innovation (Bower and Christensen 1995; Christensen 1997). The idea of architectural innovation was introduced by Henderson and Clark (1990) as one where core concepts remained the same but the architecture changed. Incumbents had difficulty managing architectural changes because their organizational and structural environments evolved to embed the architectures of their products, making architectural knowledge implicit and hence difficult to change. On the other hand, new entrants, not limited by such embedding, had no difficulty pursuing architectural innovation.

Christensen and Bower (1996) used the concept of "*performance trajectory*" to explain disruptive and sustaining changes. Disruptive changes "*disrupt an established trajectory of perform-*

ance improvement ..." (Christensen and Bower 1996, p.202) and redefine performance, creating a disadvantage for incumbents. On the other hand, sustaining changes conform to the performance trajectory demanded by mainstream customers and hence reinforce the dominance of entrenched firms. Tushman and Anderson (1986) used "*locus of innovation*" in a similar sense, arguing that the locus would differ for competence-enhancing and competence-destroying changes. To satisfy mainstream customers, companies prefer to stay on their locus of innovation or performance trajectory, forgoing alternative options. This led Christensen and Bower (1996) to propose that the failure of leading firms was because they closely listened to their customers. They argued that the failure was due to a lack of will, rather than lack of competence, on the part of the incumbent, to pursue disruptive innovation.

Disruptive innovation was viewed as one that started at the lower levels of a performance trajectory, where the customers found product features exceeding their requirements and hence paying for what they did not need. Such customers looked for modular alternatives that gave them the freedom to choose features they needed. The product attributes, business practices, volumes and margins associated with such alternatives were initially uninteresting to the established companies and their mainstream customers, but subsequently, rose to interesting levels, by which time, established companies found themselves lagging behind new entrants (Charitou and Markides 2003). Again, by this time, to the dismay of incumbents, their once loyal mainstream customers also would have defected to the disruptive innovation. To the above "*low-end disruption*", Christensen and Raynor (2003) added another type, "*new-market disruption*", which enabled whole new populations to start using a product. More recently, several instances of high-end disruption have also been identified. Stephen Elop, the Chief Executive of Nokia wrote to his employees on how Apple disrupted their high end, "*In 2008, Apple's market share in the $300+ price range was 25 percent; by 2010 it escalated to 61 percent. They are enjoying a tremendous growth trajectory with a 78 percent earnings growth year over year in Q4 2010. Apple demonstrated that if designed well, consumers would buy a high-priced phone with a great experience and developers would build applications. They changed the game, and today, Apple owns the high-end range*" (Financial Times, 9 Feb 2011).

Incumbent's difficulty is the common thread connecting low-market / new-market / high -market disruptive, architectural, competence-destroying, or radical innovations. The difficulty is created by a range of factors including (1) the filtering out of information related to the emerging technology (Henderson and Clark 1990), (2) opportunist defection by customers layer by layer (Bower and Christensen 1995), (3) the bounded rationality of the managers of the established company who were intendedly rational when they listened to their customers (Bower and Christensen 1995), but bounded by their channels, filters and strategies (Henderson and Clark 1990) while processing information and taking decisions, and (4) uncertainties related to the new technology and appropriability of benefits (Teece 1986), all of which are dimensions related to TCE (Williamson 1981). However, there have been little attempt so far to look at the phenomenon of incumbent's difficulty from the TCE perspective, although scholars have started looking at dynamic capability as a solution to the innovator's dilemma (O'Reilly III and Tushman 2008) and have noted complementarities between TCE and dynamic capabilities (Jacobides et al. 2006). This paper, which takes the efficiency route (Williamson 1981) in proposing an alternative approach to the incumbent's difficulty, is an attempt to complement existing approaches based on organizational power theories.

The Transaction Cost Economics (TCE) Approach

Transaction Cost Economics (TCE) addresses organizational issues by making transaction the basic unit of analysis. According to Williamson (1981), transaction cost is a frictional drag that constrains the smooth and costless transfer of a good or service across an interface. Williamson, through his books (Williamson 1975, 1985) and various articles, concretized Ronald H. Coase's suggestion on costs of transactions (Coase 1937) and opened a new research direction along a discipline which he called New Institutional Economics. Transaction costs refer to the various ex-ante and ex-post costs associated with market transactions, like, costs of price discovery, contract negotiation and providing for uncertainties. Such uncertainties may be related to deliverables, contract terms, contract duration, monitoring, measurements, etc. and may arise from difficulties in enforcing agreements, misalignment, misunderstanding, misinterpretation, breach, conflicts, imperfect or asymmetric information, imperfect execution of contracts, shirking, opportunism, asset specificity, poorly defined property rights, protection of property rights, unanticipated or new developments, shortcomings in planning, adapting or monitoring, and so on. (Coase 1937; Williamson 1975, 1981, 1985; North 1994, 1996). The TCE perspective has been adopted by researchers in various situations for examining the question of when a function is efficiently performed within the organization (integration) rather than across the organizational boundary (contracting, outsourcing etc.).

The critical dimensions of transactions, of interest to TCE, are frequency of transactions, uncertainty, and asset specificity (Williamson 1979, 1981). Assets which are specific to a relationship may potentially lead to ex-post bilateral dependency or hold-up problems. Alternative opportunities available for specific investments may be few or much less attractive than originally envisaged, encouraging players to resort to opportunistic behaviour (North 1996). Asset specificity may be related to the site, physical assets, or human assets (Williamson 1981). Weak property rights, undisclosed quality issues, and other information asymmetries can also lead to contractual hazards.

Two behavioural assumptions are made by Williamson (1981) about actors entering into transactions. First, they operate under bounded rationality (Simon 1957, 1978) with limited cognitive and information processing capabilities. So they have difficulty fully understanding a problem, anticipating all outcomes, taking precautions, or determining the optimal solution. Similar view arises from the rational choice framework, according to which, individuals act in their self interest, but under uncertainty (North 1996). Their choices may differ being influenced by individual's learning, society, and time. Further, the actors may not be sure of satisfactory enforcement or implementation of the terms of a contract. The second behavioural assumption is about opportunism because human beings may be "self-interest seeking with guile" (Williamson 1981, p.554). These behaviours lead to potential transaction costs.
Langlois (1992) considers the dynamic nature of transaction costs arising from technological and organizational changes. Over time and with stability, transaction costs diminish. This forms the basis of the idea that an incumbent's transaction costs reduce over time, resulting in depressed transaction cost reference and a differential between the firm's innovation options. The postulates proposed in the following sections build on this understanding.

TCE Applied to Innovation Choices: Five Postulates

In this section we use TCE to understand the transaction costs associated with innovation options and the influence of such costs on choices. We unpack innovation frameworks and

examine them through the lens of TCE, in terms of the attributes identified by Williamson (1979, 1981), namely, frequency, uncertainty and asset specificity. Emphasis will be on uncertainty and asset specificity, as transactions of interest are repetitive. Aspects related to information asymmetry and property rights will also be examined. We examine the transaction cost implications of the innovation types, innovation phases, performance trajectories, and innovation building blocks. We propose five postulates. These postulates trace the influence of transaction costs in effecting a systematic transition of markets from the incumbent to the new entrant in the event of a disruptive innovation. It is important to note that a large number of disruptive innovations fail at one stage or another and that very few actually succeed. It is also important to note that not all incumbents fail. Pro-active public policy and industry level action can help lower the transaction costs associated with disruptive innovation. Also individual firms can take steps to ensure that they do not get trapped in the low transaction costs of sustaining innovation. The five postulates are discussed below.

> *Postulate 1: Transaction cost attributes associated with the building blocks of innovation create transaction cost differentials between the incumbent's innovation options.*

Teece (1986) identified three fundamental building blocks – regimes of appropriability, dominant design paradigm, and complementary assets – which must be in place for an innovator to profit from innovation. Associated with each of these building blocks are transaction cost attributes. These include uncertainties, asset specificities, property rights ambiguities, difficulties in enforcing contractual performance, ex-post contractual hazards, information asymmetries, danger of shirking, potential opportunism, costs related to protecting property rights, and so on, that result in transaction costs to an innovator trying to benefit from the innovation. The first building block, the appropriability regime, indicates the strength of legal protection available to an innovation through patents, copyrights, trademarks, trade secrets etc. (Teece 1986). Transaction costs are high when the protection is weak, but exist even when there is tight protection. Online music store Napster, during 1999-2001, promoted peer-to-peer (P2P) file sharing allowing its users to share music and movie, forcing copyright owners to resort to legal action (Galluzzo 2009). Despite Napster shutting down, P2P services by others have continued. For many disruptive innovations, appropriability is weak because of the way they emerge and develop through distributed, collaborative, and open efforts, and the lack of clarity on property rights and asset ownerships. When IBM Personal Computer (PC) was launched in 1981, to disrupt the small computer market then dominated by Apple, Atari and Commodore, the company adopted an open architecture to achieve rapid market penetration and to make IBM PC a default standard. The goal was achieved, but IBM lost leadership and control of the standard, and the industry, to clones and IBM compatibles. The second building block, the dominant design paradigm (DDP), comprises two phases (Teece 1986). The first, the pre-paradigmatic phase, is characterized by multiple designs and frequent design changes till a dominant design emerges. The second, the paradigmatic phase, is the one in which the dominant design stabilizes and processes mature. During the pre-paradigmatic phase, the innovator needs to keep the design open, to gain user acceptance and to understand user preferences. This involves risks and transaction costs related to protecting the design and safeguarding against a competitor's design emerging dominant or a collaborator gaining control. The IBM PC standard witnessed both these events happening. Initially competitor Compaq gained control of the architecture and launched PC AT 386 ahead of IBM; later collaborators Intel and Microsoft took control of the architecture, resulting in it being renamed Wintel (Windows + Intel) architecture. The third building block of innova-

tion comprises complementary assets that the innovator needs to access to successfully commercialize the innovation (Teece 1986; Wolter and Veloso 2008). Lack of complementary assets can lead to transaction costs, as music companies discovered when they got on to the Apple iTunes platform in 2001 to fight the P2P threat from Napster and found that Apple iPod was appropriating most of the value of the business (Hagiu and Yoffie 2009). Japanese game company Nintendo, during the 1980s, leveraged complementary assets in installed platforms and distribution networks, creating high transaction costs for game developers, to keep them in line and to appropriate a high share of the value (Burgelman et al. 2004). Teece (1986) categorizes complementary assets as generic, specialized and co-specialized, implying respectively, no dependence, unilateral dependence, and bilateral dependence, between the innovation and assets. The uncertainties, asset specificities and subsequent dependencies created by specialized and co-specialized assets have transaction cost implications due to potential ex-post hazards of mal-adaptation and hold-up. Jacobides et al. (2006) elaborating on Teece's framework, found that co-specialization was made more complex, beyond bilateral dependence, by the presence of nested asset combinations in industry architectures, an important consideration, in view of the increasing trend towards innovations in ecosystems and collaborative communities (Chesbrough et al. 2006).

In view of the uncertainties, asset specificities, hold up hazards, poorly defined and/or inadequately protected property rights, ex-post dependencies, and potential mal-adaptations associated with the building blocks of innovation, we postulate that the transaction costs related to a new art are high relative to that of the existing art. A new entrant, not entrenched in the existing art, will be indifferent to this difference. For an established firm, transaction costs will be low for innovation that sustains the existing art and based on extending familiar markets and/or technologies exploiting existing assets, possibly with incremental additions. The uncertainties and incremental asset specificities associated with sustaining innovation are hence lower than that related to disruptive changes. Tushman and Anderson (1986) had observed that successive competence-enhancing technological changes decreased the uncertainty, implying that pursuing sustaining innovation had the potential to reduce transaction costs. Time and stability also lead to reduction in transaction costs (Langlois 1992). Firms entrenched in the comfort of depressed transaction costs soon take that as a reference level for further choices. Figure 1 shows how this reference transaction cost falls with time, creating a transaction cost differential that makes disruptive innovation unattractive.

Postulate 2: Incumbent's preference to sustaining innovation leaves disruptive innovation an

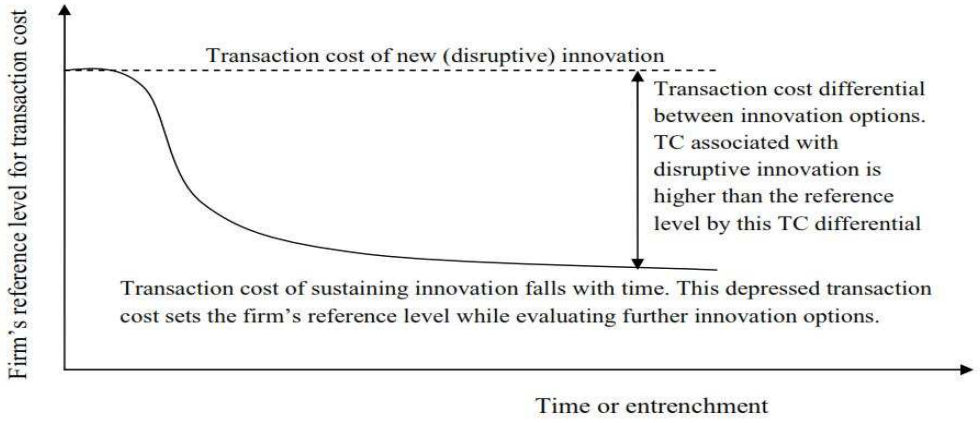

Fig 1. Firm's reference level for transaction cost, over time

attractive option to new entrants indifferent to transaction costs

Incumbent prefers a sustaining route, and often pursues it with increased vigour when threatened by a potentially disruptive innovation (Bower and Christensen 1995). Christensen and Bower (1996) cite Seagate Technologies, a leading 5.25-inch hard drive manufacturer, responding to disruptive attacks by 3.5-inch drives by introducing better heads and new recording codes in existing 5.25-inch drives. Seagate introduced new 5.25-inch models at an accelerated rate during the years 1985, 1986, and 1987, exemplifying how an incumbent typically takes on disruptive challenge by investing more in sustaining innovation.

There are two broad approaches to commercializing new technology (Christensen 1997). One is to start with known markets and then pursue technology options to serve those markets. Established firms prefer this route; for instance Hewlett Packard pushed technological limits to develop a tiny shock-resistant hard drive (Kittyhawk) in 1992 responding to a demand for portability (Burgelman et al. 2004). The second approach is to start with known technology and seek new markets for the available technology. Incumbents do not favour this option, which Christensen (1997) describes as a lack of "*marketing competence*" because the marketing of disruptive technology often contradicts the incumbents' mainstream strategy. When Seagate Technologies switched to 3.5 inch drives they continued to sell the new drives to their 5.25 inch customers (desktop computers) rather than to the new laptop market, where most of the disruptors found sales. Earlier, when the 14-inch drive manufacturer Control Data introduced 8-inch drives, their predominant market continued to be the established markets in mainframes, rather than new ones in minicomputers where disruptors sold their drives (Christensen 1997).

	Known markets, new technology options	Known technology, new market options
Incumbent	Low transaction cost Firm has the will to pursue	High transaction cost Firm has very little will to pursue
New Entrant	High transaction cost, but firm indifferent. High competition from established players Firm may not purse	High transaction cost, but firm indifferent. Low competition from established players. Firm may want to pursue

Fig 2. Incumbent pursues low transaction cost options leaving high transaction cost options to new entrants.

In transaction cost terms, the marketing challenge posed by disruptive innovation and incumbent's lack of "*marketing competence*" are due to the high transaction cost of disruptive innovation and the preference of incumbents to pursue low transaction cost option, when one is available. Disruptors, unconstrained by any depressed reference level for transaction costs, are indifferent to the high transaction costs and have no problem pursuing the uncertainties of new markets. In fact they find an opportunity in the low competition from established players. Figure 2 illustrates this situation. The incumbent has very limited will to take on the mar-

keting challenge (top-right cell) and prefers the sustaining option presented in the top-left cell due to the low transaction cost. In contrast, new entrants are indifferent to transaction costs and find a less-opposed option in the bottom-right cell, which is a potential disruptive innovation.

> *Postulate 3: Incumbent pursuing low transaction cost avoids investing in the pre-paradigmatic phase of a disruptive innovation and finds it hard to own a dominant design*

The established company enjoys a level of certainty regarding product architecture, investments, information systems, and possible operations and supply chain strategies in its entrenched product-market activity and this knowledge gets embedded in the firm's capabilities, strategies, information channels, filters, routines, and processes (Henderson and Clark 1990), reducing uncertainties, further asset specificities, and hence transaction costs related to the existing art. Transaction costs, further declining over time, result in depressed transaction cost reference for subsequent resource allocation decisions. The firm will be unwilling to make investments in routines related to an uncertain technology due to associated high transaction costs.

Transaction costs associated with the pre-paradigmatic phase of the dominant design paradigm tend to be high due to the uncertainty, unclear property rights and appropriability issues, and possible hold-up hazards related to investments in creating complementary assets (Teece 1986). Langlois (1992) argues that transaction costs include the cost of an organization not having the right capability at the right time. Firms may also fail to recognize architectural change and take up the new innovation using existing complementary assets (Henderson and Clark 1990). In terms of performance trajectory (Christensen and Bower 1996), the established company responds to the disruptive innovation with sustaining innovation. These low transaction cost pursuits take the firm away from the pre-paradigmatic phase. The resource dependence and resource allocation processes of an incumbent being oriented towards mainstream customers (Bower and Christensen 1995), the firm finds it transaction-cost-efficient to resort to incremental innovation rather than a new technology in the pre-paradigmatic phase. Thus, the incumbent shies away from investing in the pre-paradigmatic phase.

The pre-paradigmatic phase is where a new design evolves from several competing designs through an iterative process involving continuous customer interaction and product improvement (Teece 1986). At the end of the pre-paradigmatic phase, one or a small number of designs emerge as dominant. Avoiding the pre-paradigmatic phase will result in the firm failing to own a dominant design. The incumbent may try to recapture the dominant design once disruption has taken root, with great difficulty and paying a penalty, yet often unsuccessfully. The unsuccessful efforts by IBM to recapture the small computer standard during late 1980s using OS/2 architecture is an example of this.

Christensen (1997) considers leadership, rather than follower-ship, to be the better strategy for success in disruptive innovation. Nevertheless, there have been exceptions. For instance, Microsoft entered the browser market with its Internet Explorer as a follower and achieved dominance by bundling it with its Windows operating system. Microsoft was exploiting its ownership of complementary assets to achieve this. However, unless legal protection is weak or the follower controls a large part of complementary assets, it is unlikely that a follower will capture dominant design.

Postulate 4: Declining transaction costs confer subsequent advantage to the new entrant

As discussed, the transaction costs of new entrants for disruptive innovation will be higher than the transaction costs of incumbents for sustaining innovation. New entrants thus enter the market with a transaction cost disadvantage, and are hence forced to build competitive advantage in other areas, which may be efficiency (for cost-sensitive low-market or new-market disruptions), or flexibility, product features, customer intimacy etc. (for feature-seeking high-market disruptions). This can provide the disruptor subsequent superiority in operations, compared to the incumbent, enabling the disruptor to trace a steeper trajectory that sooner or later cuts through the performance trajectory of mainstream markets (Bower and Christensen 1995). Since transaction costs reduce in the long-run (Langlois 1992; North 1996) due to reduced uncertainty, learning, process stabilization, technology maturation, and so on, the new entrant will subsequently be at an advantage. The entrant's technological superiority and/or operational efficiency, built in the early stages, stay with it and help it grow faster as markets develop.

An example of this carried forward advantage is the way Southwest Airlines carried its low cost, short-haul, no-frills model, created and perfected in the 1970s operating between three Texas cities, to other markets, in California, the Midwest and the Northwest. Initial setbacks in Texas helped the company create a culture of frugality, enthusiasm and fighting spirit that led to high operational efficiency and low costs. When the airline entered new markets it could easily slash prevailing prices and force competition to exit. In the Los Angeles – San Francisco route, one way fare dropped from $186 to $59 upon Southwest's entry, according to a 1993 report (Bennet and Craun 1993), a vivid illustration of how declining transaction costs work to the disruptor's advantage.

Postulate 5: Mainstream markets switch to disruptive innovation when their transaction costs related to such innovation fall to levels comparable to that of the existing art

A key reason for an established company's lukewarm response to disruptive innovation is the challenge of retaining mainstream customers and taking them along with it to the new regime, especially when competitors may be waiting to make opportunistic attacks to grab clients. During the late 1990s, the Enterprise Systems Group of Hewlett Packard (HP) joined hands with Intel to develop a new processor, Merced (later named Itanium), in a bid to switch from proprietary RISC/Unix platform to a more open architecture, anticipating disruption from CISC/Windows architecture. Despite HP's promise that the new design provided for upward compatibility of existing client installations and their migration, competitor Sun Microsystems could launch a convincing campaign alleging that HP's long term plan was not in the interest of mainstream customers. HP lost many customers to Sun even before making the disruptive move (Burgelman et al. 2004).

Hence, often, established companies stay with sustaining innovation to avoid loss of mainstream clients. In sustaining a relationship, both the company and its clients share the benefits of falling transaction costs due to the level of confidence and certainty they enjoy in relation to contractual performance and asset specificities. The low transaction cost keeps the relationship going and companies resist disruption fearing loss of clients. However, if the client has another choice with comparable transaction cost, the company may not be able to stop the client from switching, particularly if there are other benefits. From the client's perspec-

tive, the transaction cost of their relationship with the established company initially stayed lower than that associated with the disruptive innovation due to doubts, uncertainties, information gaps and new asset specificities related to the change. However, over time, as disruptors prove their product/service in the market, uncertainties reduce and transaction cost becomes comparable to that associated with established companies. At this point the client may switch, considering aspects like newness of technology, decentralized configuration, convenience, ease of use and faster growth that often feature in products of disruptive innovation. When transistor radios were initially introduced, there was considerable uncertainty related to their performance quality and clients of existing vacuum tube radios continued to purchase vacuum tube radios for most of the 1950s and 1960s. However, when the performance uncertainties of transistor radios decreased, clients switched readily to the disruptive product considering aspects of convenience, portability, small size, speed, and so on (Christensen et al. 2001).

Discussion

The five postulates relate to the implication of transaction costs at different stages of the innovation process. While an incumbent, preferring a sustaining route due to transaction cost differential, avoids the pre-paradigmatic phase of a new innovation and fails to own a dominant design; a new entrant finds an opportunity in disruption, creates further advantages, and finally gets to the mainstream markets. The cycle repeats through subsequent innovations, sustaining or disruptive, both creating value. Sustaining innovation helps incumbent achieve high value realization moving up-market, but makes it vulnerable to disruptive attack by others (Christensen et al. 2001). To stay in the market, firm needs to disrupt itself and achieve repeated cycles of innovation. Incumbent's difficulty takes an established company along a sustaining trajectory causing it to miss innovation cycles.

Figure 3 shows two innovation cycles. The incumbent's challenge is to own the second cycle, rather than leaving it to a new entrant. This depends on whether the incumbent can make the transition from sustaining innovation to disruptive innovation, overcoming the dif-

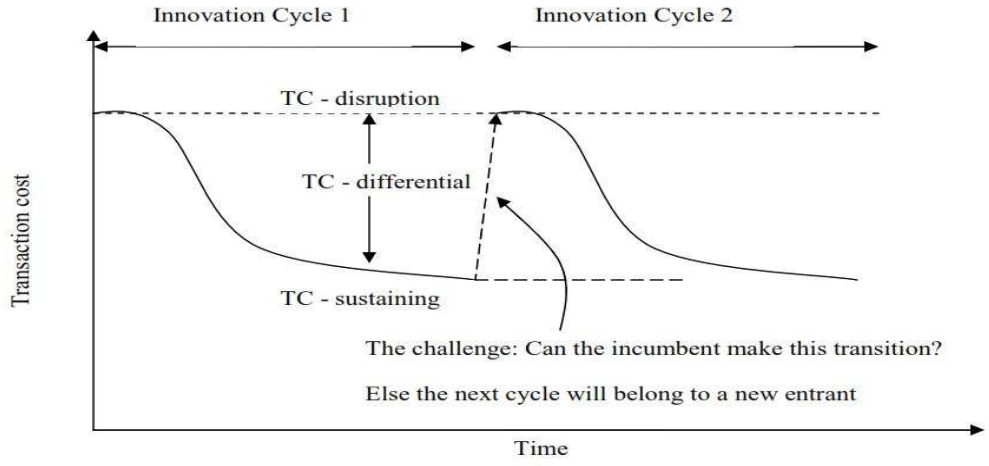

Fig 3. Transaction costs related to innovation cycles

ferential. The differential represents the barriers to gaining financial acceptance for the proposal and commercializing the innovation. The differential should be minimal and for this, the transaction costs of sustaining and disruptive innovations should be comparable. TCL seeks to achieve this.

During the transition, in addition to climbing the barrier, the incumbent will also need to maintain two transaction cost regimes – one associated with sustaining and the other with disruptive innovation - till the mainstream customers switch to the new, or else the firm runs the risk of losing them to competitor (recall the HP Merced Case where Sun captured HP's customers). It is not easy for a firm to concurrently have two transaction cost regimes in the same organization. Christensen and Overdorf (2000) argued that there is a certain minimum return a firm will be willing to accept which in turn decides the type of innovation it will be willing to pursue. Thus firms have a dominant innovation option and an associated transaction cost regime. To support two transaction costs, separate organizations may be needed. Bower and Christensen (1995) recommended the creation of a standalone organization to commercialize disruptive innovation. The standalone organization will not be influenced by the low transaction cost of the entrenched incumbent, which may continue to pursue sustaining innovation catering to existing customers. When IBM developed the open PC architecture as a disruptive technology in the early 1980s, it used a remote facility at Boca Raton, Florida (Kanter 2006) to keep the project out of the corporate environment's low transaction cost. Chandy and Tellis (2000) found that decentralized autonomous organizational units have helped large established firms to be agile while creating or responding to technological innovations.

Another option to have two transaction cost regimes is to go for inorganic acquisition. Low transaction cost parent finds it difficult to create the environment for disruption and hence brings in disruption through acquisition. The firm should, however, avoid integrating such acquired organization into the parent, neutralizing the advantages sought in the acquisition (Christensen and Overdorf 2000).

The transaction cost differential can be minimised by raising the reference level (i.e. the transaction cost associated with sustaining innovation) or lowering the transaction cost of disruptive innovation, or both. Resisting excessive integration helps avoid too much depression of the transaction cost of sustaining innovation and hence the reference level. By balanced use of outsourcing options and agile supply chains, firms can achieve low to medium levels of integration. On the customer side avoiding high dependence on specific customers by widening the customer base can help avoid excessive integration.

Another way to raise the reference level will be for the firm to evolve a system to account the depressed transaction cost of sustaining innovation and compensate for it while evaluating options. Evolving an accounting system for this is beyond the scope of this paper.

The transaction costs associated with disruptive innovation may be brought down, through institutional arrangements, public policy and industry-level initiatives. Institutions play an important role in promoting market efficiency, growth and stability. They evolve over time and help reduce transaction costs by creating order, reducing uncertainty and providing mechanisms to enforce contracts and resolve disputes (North 1991, 1996; Hodgson 2006). Standards institutions (e.g. IEEE and ANSI) can help reduce the uncertainties related to the dominant design and hence transaction costs. Other institutions that can help reduce the transaction costs of disruptive innovation include venture capital financing institutions, well enforced intellectual property regimes, legal and accounting systems, transparency, and supportive infrastructure including industrial clusters.

In addition to the external environment, the firm also can launch efforts to reduce costs of

disruptive innovation by taking an early dip in promising technology options. Companies which invest in exploring future technology may be able to keep the transaction costs of disruption low. Electronics Arts, during the 1990s, successfully accomplished this by creating "tiger teams" that pro-actively created competence in new technologies (Burgelman et al. 2004). O'Reilly III and Tushman (2008) proposed ambidexterity as a dynamic capability to address the incumbent's disadvantage. Hill and Rothaermel (2003) suggested that firms should invest in basic and applied research, as well as product development efforts to develop organizational capacity to assimilate new technologies.

Further Research

This paper has attempted to open a new research path for incumbent's difficulty in innovation using the efficiency theory of transaction cost economics to complement extant research which has largely focused on power theories. Further research may include seeking empirical support for the five postulates proposed, modifying or refining them, and also studying various related phenomena like the role of Government and institutions in controlling transaction costs. Chandy and Tellis (2000) found that incumbent's difficulty had decreased towards the end of last century, which coincided, in time, with increased outsourcing, globalization, global trade, proliferation of science and technology parks, and worldwide reduction in tariffs, all of which could help level transaction costs. There is abundant scope for empirical research on the mediating role of transaction costs in this regard.

Developing accounting models and practices to implement TCL is another possible research area. As discussed earlier, one of the ways to achieve TCL is to account for the depressed transaction costs of entrenched innovation options. Details of how this can be done in practice will need further study and development of models that can account transaction costs of different innovation options.

Conclusion

This paper has introduced the concept of transaction cost levelling (TCL) as an alternative or complementary approach to reduce the incumbent's difficulty in innovation and has proposed several postulates. It has provided useful insights for business units, industry, institutions and Government to understand why incumbents face certain difficulties in achieving innovations of a breakthrough nature. Substantial scope exists for further research on how to realise transaction cost levelling. We have suggested a few.

Correspondence

Professor K.G. Satheesh Kumar,
Dean (Academics), Asian School of Business
Technocity, Pallippuram
Trivandrum 695 316, India
Email: k.g.kumar@ieee.org
Tel.: +91-471-6579001, 2

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