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THE LIMITATIONS OF DYNAMIC CAPABILITIES

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INTRODUCTION

The concept of dynamic capabilities draws its theoretical basis from two classic traditions within the strategy field – the resource based view of the firm (RBV) (Wernerfelt, 1984) and market positioning (Porter, 1996)¹. A dynamic capability qualifies as a source of sustained heterogeneous firm performance within the RBV framework because it arises from embedded organizational routines that accumulate in a path dependent process - the “stock” explanation of durable advantage (Barney, 1991). Because such a dynamic capability allows a firm to continually reposition itself in product market space, it satisfies the “flow” explanation of current competitive advantage by ensuring that the firm always maintains a wider gap between willingness to pay and cost than competitors (Brandenburger and Stuart, 1996). Indeed, dynamic capabilities seem to give rise to the enviable ability to “always have a competitive advantage in an attractive industry” and so continually deliver superior financial performance regardless of external circumstances.

Before reaching this conclusion, however, we must clarify the theoretical concept of dynamic capabilities and illustrate the existence of the phenomenon in the real world. This paper seeks to achieve these tasks, first, by unpacking the concept of dynamic capabilities and confronting the types and levels of capability thereby identified with the tests of value creation posed by both strategy traditions. And, second, by examining Danaher, the most successful US conglomerate of the last thirty years, which has crafted a business system (the Danaher Business System (DBS)) for continuous improvement that appears to demonstrate many of the appealing characteristics of a dynamic capability.

The paper’s most important conclusion is that while dynamic capabilities (of all types and levels) can be valuable, they are not the ultimate source of sustainable competitive advantage. While developing such capabilities is desirable, there are important limitations to their effectiveness.

Specifically, the paper will argue there are theoretical limits to the value of dynamic capabilities. Even if a particular capability, such as Danaher’s DBS, is not directly imitable because it involves organizational ambiguity, it can be substituted by slightly different capabilities, such as UTC’s ACE (achieving competitive excellence) system or ITW’s 80/20 process methodology, which themselves arise from unique and inimitable path dependent processes. Because dynamic capabilities arise from choices about internal activities that do not draw from competitive factor markets, there are no limits to the number of competitors that can develop their own versions of the capability.

Moreover, the more capable the firm is in identifying new markets, resources and combinations, the more it comes into competition with other firms with their own version of such

¹ Itself drawn from industrial organization economics.

capabilities. Ironically, as the dynamic capability opens additional opportunities to a firm (which is one of the main attractions of such capabilities), so the set of competitors to whom it must be superior also expands – think how Alphabet now competes with Apple, Microsoft, Amazon and Facebook in many parts of the broader online ecosystem. Unfortunately, it is not just having a dynamic capability that is necessary, it is having a capability that is better than that of every possible competitor. For the dynamic capability to be truly rare and valuable, it must be an extraordinary capability that ultimately only one firm in the universe can possess!

More pragmatically, making the commitments necessary to pursue any dynamic capability involves making choices that are subject to the same tradeoffs as any traditional product market strategy (Porter, 1996). All activities and every aspect of organization design – structure, processes, metrics, incentives etc. – have to be aligned if the firm is to effectively implement the dynamic capability. Since every choice constrains what the firm can and cannot do, pursuing a dynamic capability cannot produce an organization capable of doing everything at the same time.

The obvious such tradeoff is the classic exploration/exploitation dichotomy (Ghemawat and , Ricart, 1993, O'Reilly and Tushman, 2004) which we will interpret more generally as the conflict between higher and lower level capabilities. Putting together a new combination of activities to exploit a desirable but novel position, which is the appeal of Teece, Pisano and Shuen's original version of dynamic capabilities (Teece et al 1997, hereafter referred to as TPS), involves a tradeoff with building the lower level capabilities necessary to deliver the static efficiency (or lower level capabilities) required to effectively execute any product market position. Thus while dynamic capabilities are valuable, they have the same inherent limitations as any traditional strategy in being unable to achieve all types of competitive advantage at the same time.

Danaher clearly illustrates these constraints on the value of dynamic capabilities (Anand and Collis, 2008). While Danaher has been successful for a long time, has continuously altered its business portfolio, and has upgraded its process improvement toolbox – both important manifestations of a dynamic capability - it is limited in how far it can move from the core DBS philosophy. Ironically, if Danaher were to attempt to demonstrate a higher level dynamic capability by moving to some other management system, the fact that DBS only works because it has been practised for thirty years, makes changing to and implementing that new system difficult. It is the accumulated expertise in operating DBS that allows Danaher to outperform competitors seeking to develop their own versions of DBS. A switch to a new management system would incur resistance from managers, would lose critical experience, and would face the same struggles as any other firm in trying to deploy the new system.

CONCEPTS

The first section lays out a conceptual framework to explain the role dynamic capabilities play in competitive advantage. It proceeds by identifying the conditions that make dynamic capabilities valuable by establishing their relationship to resources and market positioning; and then describing two types and various levels of the phenomenon. It concludes by demonstrating the theoretical

limitations to all these various notions of dynamic capabilities, in particular the tradeoffs that are incurred when pursuing dynamic capabilities of the type powerfully advocated by Teece et al (Teece, Pisano and Shuen 1997, Teece 2013).

A) RESOURCES AND CAPABILITIES

We begin by following the resource based view of the firm (RBV) and observe that it is stocks that are at the core of sustainable competitive advantage. Durable intra-industry differences in performance arise because firms are heterogeneous bundles of resource stocks that are difficult to acquire and take time to alter ie rents accrue to factors in inelastic supply (Barney 1991, Barney and Clark 2007, Dierickx and Cool 1989, Peteraf 1993, Wernerfelt 1984).

We note there are three types of resource: tangible assets, such as a real estate location or a physical network of optical cables; intangible assets that represent an accumulated stock of knowledge, such as patents and technological knowhow, or the customer awareness of, and experience with a brand; and organizational capabilities which represent the efficiency with which an entity converts inputs into outputs – the firm-specific F of the production function (Collis and Montgomery 2005), or what Teece calls “the capacity to utilize resources to perform a task or an activity” (Teece 2014). Like any stock, these organizational capabilities are accumulated over time, in this case through the experiences of the people in the organization, their routines, and path dependent interactions (Barney 1986).

Importantly, the RBV identifies the conditions that make any resource, including a dynamic capability, a source of abnormal profitability. We follow perhaps the most accepted set of criteria - Barney’s VRIN (valuable, rare, inimitable and non-substitutable²) - and argue that, to be a source of sustainable competitive advantage, dynamic capabilities must pass those tests. Valuable implies that the capability creates something for which consumers have a willingness to pay. Rare acknowledges that the product of the capability has to be competitively superior³ – I might have a desirable mall location, but a competitor with a corner street location that generates more foot traffic will actually have a competitive advantage. Inimitability tests the ease of direct replication of the capability by a competitor, and non-substitutability its vulnerability to replacement by a different capability or resource that satisfies the same consumer demand at lower cost or with a higher willingness to pay.

B) DYNAMIC CAPABILITIES AND MARKET POSITIONING

To understand how dynamic capabilities affect current performance we revert to the framework which describes competitive advantage at a point in time – Porter’s positioning analysis. This complements the resource perspective by demonstrating how a preferred stock of resources generates a current flow of profits from the performance of a unique combination of activities. The

² Although even Barney has two versions of these conditions – the other being VRIO, with O organization (Barney and Clark 2007). Other similar categorisations exist eg Collis and Montgomery 1995.

³ Barney argues that provided the market structure supports oligopolistic rents, several firms with similar resource stocks can be profitable (Barney and Clark 2007). However, even in this situation, one firm will still possess the competitive advantage over all others.

two perspectives are duals of one another since stock levels determine the flows required or generated in each period, and flows (including depreciation in stocks) determine the level of next period stocks – the metaphor of the (stock) level of water in a bath and the flows coming in at the taps and going out through the drain.

Firms make a strategic choice about where to position themselves in a market by adopting a unique combination of activities that delivers a distinctive value proposition to customers (Collis and Rukstad 2008, van den Steen 2012) and which opens a wider wedge between customer willingness to pay and supplier opportunity cost than competitors (Brandenburger and Stuart 1996). Importantly, as Porter has identified, what makes the choice of activities strategic is that each involves a tradeoff. Choices that both improve willingness to pay and reduce cost, such as using LED lighting in a car, are merely efficiencies that shift the production frontier outwards (Exhibit 1) (Porter 1996). In contrast, offering a larger engine in a car might increase willingness to pay for some segments of the market, but involves a tradeoff with higher cost.

Having chosen a competitive position, the first challenge for an organization is to deliver this in the most efficient way currently possible. Static efficiency (what Porter calls operational effectiveness) represents the ability to reach the current productivity frontier along the vector representing the strategic choice. At this point we are in a completely static world in which organizational capabilities represent how close the firm is able to operate to the productivity frontier (the old notion of X-inefficiency, Liebenstein 1966, given modern evidence by Bloom et al 2010). Given a certain combination of inputs, how effective is the organisation in transforming those into the desired outputs? These organizational capabilities can be thought of as the outcome of a firm's static routines – where to locate the machine on the shop floor, what forms to fill in to order a part – and result from the specific processes employed by any firm and the unique history and idiosyncratic personal experiences of its employees.

Introducing dynamics to this representation of competitive positioning, we identify the first type of dynamic capability as the ability to move the production frontier outwards. The first order dynamic capability of this type is the ability to push the frontier along the chosen vector by improving the efficiency with which the existing set of assets and capabilities are deployed ie the practice of continuous improvement. In this regard, there is probably little requirement for adding new resources, combining new activities or much change required to the current way of operating or business model. This dynamic capability can be thought of as changing static routines. The location of the machine on the shop floor is altered to make transferring parts to the next step in the process easier. A "cc" is added to the order form so that another part of the organization is automatically made aware of the request. A new employee is hired to replace someone who did not show up for work regularly. After unfavorable experiences in foreign markets, an M&A rule is established that the firm will not pursue overseas targets, and so on.

A higher order dynamic capability of this type would be the development and application of a routine to ensure efficiency improvements were continuously pursued. Such a process might be value stream mapping, or six sigma methods which can be applied to any activity. Or it could be a

performance management system that motivates employees, perhaps by replacing the lowest 10% of personnel each year – the infamous forced ranking of Jack Welch at GE. Each of these capabilities can be thought of as ensuring the firm is always “doing things right” as it implements its chosen strategic positioning and continuously improves how it does so.

An earlier paper essentially used this representation to argue that there was no ultimate source of competitive advantage from dynamic capabilities because the rate of change of improvement would be a second order capability; the ability to increase that rate of change a third order capability and so on, as capabilities of the “learning to learn to learn” variety superseded each other (Collis 1994, Winter 2003, Bolton? 2014).

C) THE ROLE OF TPS DYNAMIC CAPABILITIES

We distinguish another type of dynamic capability (TPS) which perhaps better represents the original Teece et al notion. Rather than capturing higher moments of the rate of change along a given vector, this represents the ability to move to a new location on the production frontier as external circumstances change (Eisenhardt and Martin 2000, Teece et al 1997). In one of his most recent restatements of the notion Teece asserts that dynamic capabilities “enable the firm to integrate, build and reconfigure internal and external resources to address and shape rapidly changing business environments” (Teece 2013 p 4.)

The important distinction is that TPS dynamic capabilities produce a shift to a new strategic position and so require a reconfiguration of activity choices rather than just an improvement in the way a specific activity is performed. As a result, the firm is no longer tied to the prior market position, but can identify and exploit a new source of competitive advantage by acquiring or building a new combination of resources. This is the Schumpeterian ability to recombine, reconfigure and create new assets to realise an entrepreneurial opportunity and can be thought of as addressing the prior strategic question of “doing the right thing” rather than just doing the same thing in better ways. In the current entrepreneurial vernacular it is the ability to “pivot” to a new business model that is critical to the TPS dynamic capability (Reis 2011). Notice that while it is easy to see how a small startup is able to effect this switch since it has yet to commit to any business model, it is harder to envisage the changes required in a larger enterprise that has been pursuing a business model for years and has built its entire organization structure, systems, processes and culture around that approach.

The first order TPS dynamic capability would be a one-time ability to either alter the industry in which existing capabilities were applied, or to accumulate additional resources that allowed the firm to reposition itself on the production frontier. The former would be exploiting the fungibility of a capability by extending the scope of the firm into a new, more attractive segment or industry, as GE exited the rapidly commoditizing consumer electronics business in return for acquiring the much more profitable medical electronics business from Thomson (Collis 1989). The latter would be the capability to add a single new skill, such as when Babcock and Wilcox developed project management skills to move from being simply a manufacturer of boilers to become an engineering services firm⁴, or to

⁴ Ref to Wells case

develop a new technology, such as LG's development of OLEDs for flat screens. In this way, the firm evolves with the external landscape and upgrades its portfolio of businesses and resources. Indeed, others see such "strategic agility" as the key to long term success and illustrate its importance in the contrasting fates of competitors which pursued parallel paths before diverging, as, for example, happened to Walmart and K-Mart (Wells 2012).

Teece identifies three skills necessary to building a dynamic capability – sensing, seizing and transforming (Teece 2007). Of these it is the transformational skill – continuous renewal - that is most valuable and difficult to build because it requires the metaprocess of "asset orchestration" (Teece 2007) to "build, deploy and reconfigure resources" (Teece 2013 p. 8). This can be interpreted as a second level, higher order, TPS dynamic capability which is the continuing ability to adjust to new opportunities. Perhaps this capability is embedded in a routine, such as IDEO's new product development skills that continually search out new ideas, or in a culture of strategic challenge and debate, as at Intel and IBM, which forces management to continually examine their strategic assumptions and direction. Increasing levels of this TPS dynamic capability would allow the firm to continuously change direction and regularly build new combinations of capabilities – perhaps by outsourcing activities and recombining third party efforts, as a kaleidoscope continually rearranges a picture. Or the capability could improve the process of developing new positions, perhaps by introducing a new way of framing strategic problems, as applying the "disruption" framework led to the identification of new opportunities and threats for many firms (Christensen 1997, Grove 1999). Either way, as with the "continuous improvement" type of dynamic capability, there are clearly multiple levels of the TPS capability – each one allowing for a quicker, better, more radical reconfiguration of assets to satisfy a potentially newer, faster growing, more highly valued customer need.

D) TESTS OF TPS DYNAMIC CAPABILITIES

1) VRIN

Any organisational capability (of whatever type or level) must pass the tests for a source of sustainable competitive advantage if it is to be a source of value creation. Does the TPS dynamic capability pass the VRIN tests⁵? It is clearly valuable since it allows a firm to adjust to exogenous changes, to amend its positioning to accommodate new demands, and supports the flexibility to respond to imitation, substitution or saturation. This, after all, is the appeal of the capability to every practitioner, and which dangerously verges on becoming the ultimate capability "to always have a competitive advantage".

Is the TPS capability rare? Merely possessing a capability will not lead to a sustainable competitive advantage unless it is competitively superior to all other similar capabilities. Thus it must

⁵ This section examines in more detail TPS dynamic capabilities, although any argument applied to them can also be applied to the more "mundane" continuous improvement type of dynamic capability.

be true that a TPS dynamic capability is “better” than that which others, who might also be looking to pursue the same opportunity, possess. This is a much more difficult test to pass than just having the ability to respond flexibly to changing circumstances. No longer is it just having a capability to adapt to the digital revolution that is necessary, but that capability has to be better than competitors.

Unfortunately, as the TPS capability becomes the ability to readjust to new circumstances and as other firms seek to build those same capabilities, the set of potential competitors against which the firm’s capabilities have to be evaluated, expands. At the extreme, the set becomes every firm in existence since the ultimate version of this dynamic capability would allow any firm to pursue any new business opportunity. In some ways this is what is happening as Alphabet, Facebook, Apple, Tesla, Amazon, Microsoft, each from a very different business and each with a very different past strategy and positioning, converge on the same emerging market opportunities, such as drones or driverless cars. Those like McGrath with “the end of competitive advantage” (2013), D’Aveni “hypercompetition” (1994), Kim and Mauborgne “blue ocean” (2005), and Teece himself “next generation competition” (Teece 2012) who argue that traditional industry boundaries and notions of positioning become irrelevant as broader ecosystems emerge and competitors continually readjust their boundaries and partnerships, only highlight this challenge to dynamic capabilities. If this is indeed the landscape today, the challenge becomes to build the one rare dynamic capability that is better than every other firm! Given today’s competition among the FAANG’s, it is apparent that rarity becomes a real issue, even for extraordinarily successful companies!

Is the TPS dynamic capability inimitable? As Teece recognizes, inimitability is key to any resource or capability being a source of long term superior performance (Teece 2013 p42). A simple rule or routine, like to acquire the number one, two or three player in an industry is eminently imitable. Higher order routines are, as Teece notes, probably harder to imitate and so are more desirable. Furthermore, as Rumelt and others have observed, organizational capabilities are one of the more difficult resources to imitate because of their ambiguous nature (Lippman and Rumelt 1982, Barney 1986). Embedded in organizational routines that are hard to document, reliant on tacit knowledge and path dependent because they represent the complex interaction over time of people and processes, any single TPS capability might be hard to directly imitate. Without a clear identification of the source of the organizational capability, imitation degenerates into “superstitious learning” whereby seemingly trivial or irrelevant actions are identified as critical and so copied. Indeed, it is perhaps here that individual leaders come into play. Apple without Steve Jobs will simply not be as effective developing breakthrough products however hard the company uses the Apple University to capture the culture that drove its past success. Thus direct imitation of a dynamic capability is likely to be hard, if not impossible.

However, we now have to address the non-substitutable test of value. While any specific dynamic capability might be inimitable because it is ambiguous, each firm can nevertheless construct its own inimitable version of TPS capabilities. Samsung might never be able to exactly copy the TPS capabilities of Apple, but it can build its own idiosyncratic version of TPS capabilities. Substitution by some similar version of the original capability is feasible because the capability is not drawn from a competitive factor market, but is created internally by each company along their own idiosyncratic

path. There is no limit to the number of firms that can have a similar (though not exactly the same) dynamic capability, since it does not draw on an asset or resource that is in short supply ie the scarce factor that generates rents. In principle, there can therefore be an endless supply of dynamic capabilities, all of which could substitute for each other and so create the challenge to rarity of the capability.

2) TRADEOFFS WITH LOWER LEVEL CAPABILITIES

Building a TPS capability cannot involve a tradeoff with lower level capabilities or else the firm with the dynamic capability might lose out to competitors who are perhaps less flexible in moving to new positions but are more efficient in executing against any given position and more effective at advancing the production frontier along that vector at a faster rate. TPS dynamic capabilities cannot just reposition the firm, they have to reposition the firm and simultaneously allow it to execute better than competitors who are also pursuing that position. Even if there are first mover advantages in the new market, if a later entrant (with inferior TPS dynamic capabilities because it merely copied rather than innovated the new position) has superior lower level capabilities, it will, in time, overtake the explorer. Again, this is much more demanding than just having the capability to switch positions, since the firm must also be able to efficiently recombine resources in new ways and then consistently redesign all the lower level capabilities. This is equivalent to the difficulty of changing the engine on the plane while flying at 36,000 feet.

Indeed, this is the same challenge posed of the ambidextrous organization as it struggles to supercede the tradeoff between exploration and exploitation (O'Reilly and Tushman 2004, Ghemawat and Ricart I Costa 1993, March 1991). While some authors hold out hope for the ability to transcend the tradeoff involved as "organizations make the explicit and implicit choices between the two" (March 1991, p.71), and offer suggestions for how to do so (O'Reilly et al 2009 Christensen 1997), the fact that they struggle to find illustrations and offer complex organizational compromises as solutions, suggests the difficulty of achieving this goal. While intellectually appealing, superceding inherent tradeoffs is pragmatically difficult⁶.

If one examines what some of the simple investments required to be able to continually reposition and reconfigure the firm would look like, we can, for example, note obvious tradeoffs with cost efficiency when investing in dynamic TPS capabilities. Options that provide flexibility are always costly. Perhaps the firm invests in assets that have value in more potential future states of the world – a boiler that can use both oil and gas fuel – to hedge its risk. Perhaps the firm holds a reserve of cash to be able to make an acquisition when others cannot act. Perhaps it invests more in brand building than is statically efficient so that the brand name can be stretched to cover a different positioning at a later date. Perhaps salesmen are hired that have better skills than are currently required so that they can support a broader "solutions" sale rather than just possessing the narrow ability to sell a single

⁶ Tradeoffs resolve the "infinite regress" problem confronting dynamic capabilities of the continuous improvement type that I identified earlier (Collis 1994). When building higher order capabilities undercut the effectiveness of lower level capabilities, firms face a choice. They must choose a strategy that is dynamically more effective, but currently less efficient, or vice versa. They cannot have their cake and eat it too.

point of product differentiation. Regardless, investing in resources or capabilities that support flexibility necessarily involves a tradeoff with current efficiency (or plausibly even dynamic capabilities of the first type that drive continuous improvement along a given vector or strategic direction), or as March states, “adaptive systems exhibit too many undeveloped new ideas and too little distinctive competence” (March 1991 p.71).

We can also identify a dynamic inconsistency between the organizational requirements of a TPS dynamic capability and static or lower level dynamic capabilities. Indeed, that tradeoff arises out of the very strength of organizational capabilities as hard to imitate. Vesting in complex routines and personal interactions makes organizational capabilities hard to develop and so difficult to change and rebuild (Leonard-Barton 1992).

We all know how organisations resist “flavor of the month” initiatives, confident that “this too shall pass”. If, for example, it is known that an alternative set of processes and routines will be employed in the near future when the firm has pivoted to a new position, the organizational commitment to the current processes will be lacking. Why should I invest to learn or perfect the current system, when there will be yet another one to master next year? A TPS dynamic capability which builds in the expectation that everything can change at any time, will inhibit development and execution of the procedures that are necessary for success today. At Pixar, for example, Steve Jobs argued that the integration of technology and creativity that arose from mixing Phd scientists and animators trained in storytelling took at least ten years (Collis and Alcacer 2009). Creating the requisite culture was not simply a matter of hiring the two types of personnel and putting them together in a room. AG Lafley, CEO at Procter & Gamble, put it another way. When his predecessor was fired for the failed implementation of a new matrix organization structure (O2005), one of Lafley’s first announcements was that he was retaining that structure. To make the structure effective, he recognized that the organisation needed to go through a number of “repetitions” (Bartlett 2014) to bed down the new processes and informal routines that would make the formal lines of authority and reporting described in the structure come alive. If a TPS dynamic capability prevents the organization going through the iterations required to execute a new positioning, or even if that is perceived to be likely by employees, then no positioning will ever be effectively implemented. Low level capabilities result from the consistent application of a set of routines over a period of time, and TPS dynamic capabilities are the antithesis of that approach.

The presence of underlying tradeoffs between types and levels of dynamic capabilities, leads us back to the traditional need to make choices among different strategies. Dynamic capabilities do not allow companies to effectively satisfy all potential customer needs in all possible states of the world.

THE EXAMPLE OF DANAHER CORPORATION

Having shown the theoretical advantages and limitations of dynamic capabilities of both types, the paper now seeks to illustrate those in a case example. This section draws on archival research and interviews with senior management at the corporate office and in various Danaher

businesses. The description of the strategy has been published as an HBS case which is summarized briefly here, before examining DBS through the lens of the dynamic capabilities framework (Anand and Collis 2008).

Specifically, we describe how the Danaher Business System – embedded in its management processes and twenty five years of accumulated experience - is designed to drive continuous improvement in the performance of all important management processes from shop floor productivity, to ideation, and strategic planning and financial management. The success of Danaher in creating shareholder value by improving the operating performance of acquired companies by about 700 basis points, demonstrates that DBS is a successful example of a dynamic capability. More interesting is that the process of continuous improvement at Danaher, is itself the subject of continuous improvement so we can argue the company has built a second order dynamic capability – by creating a process to improve the process of continuous improvement.

But Danaher has gone beyond simply pursuing higher orders of the continuous improvement type. It has demonstrated certain of the TPS dynamic capabilities. Specifically, it has transformed its business portfolio over the last decade, which illustrates the capability to redeploy capabilities into different, more attractive industries. It has also added new capabilities, such as innovation and leadership, illustrating the TPS ability to acquire and recombine additional capabilities.

Going forward, the recently announced split of Danaher into two separate entities will provide a unique opportunity to observe how dynamic capabilities evolve from a common heritage⁷.

HISTORY OF DBS

Danaher Corporation has been the most successful conglomerate in the US over the last thirty years. (Exhibits 2 and 3). It has delivered more than a 20 % annual return to shareholders since going public in 1984 with a strategy of acquiring and then continuously improving a set of technologically differentiated market leaders in a range of B2B businesses from dental drills to electronic test equipment and petroleum fuel dispensers. The source of its value creation has been the careful selection and pricing of acquisition candidates, and, more importantly for this paper, the application of the Danaher Business System (DBS). The system is built around a set of (now over 60) tools that drive continuous improvement in every business process, and which are embedded in every management level from the shop floor to HR executives and design engineers.

Founded as an investment company by two Rales brothers in 1980, Danaher quickly made a number of acquisitions and went public in 1984, joining the S&P 500 in 1986. In 1988 the company began to focus on improving its subsidiaries' operations and implemented companywide a version of Toyota's lean production system that had been successfully applied in one of its divisions. When George Sherman was hired as CEO from Black & Decker in 1990 he began to reorient the company's portfolio to more attractive industries and committed to the application of what became known as the Danaher Business System. Under his successor, Larry Culp, hired in 1990 and appointed CEO in

⁷ Ref to Noda and Collis telco paper

2001, the firm continued its acquisition program at a rate of seven or eight companies a year, while embedding DBS in every new subsidiary and making DBS the operating philosophy for the entire company. By 2014, when he announced he was stepping down as CEO⁸, Culp had built Danaher into a \$20 billion company active in Test and Measurement, Environmental, Life Sciences and Diagnostics, Dental, and Industrial Technologies sectors operating with over 40 divisions and 66,000 employees and a market capitalization of \$55 billion generating a post-tax return on equity that averaged over 13% including the years of the Great Recession (Exhibit 4).

The success of DBS was illustrated in margin improvement at most companies Danaher acquired. Typical improvements were of the order of 700 basis points (Exhibit 5). A recent example was the dental business where a \$600 million business in 2005 with a 5% operating margin had been turned into a \$2.1 billion business with nearly 15% operating margins by 2013⁹.

To make DBS work requires an aligned set of policies that have been pursued for an extended period of time. Individually, each of the processes included in DBS is pedestrian and commonly used by nearly all firms. What is distinctive is that they have been assembled into an integrated whole and legitimized through years of application by the same management team. Divisions begin by setting the strategy – defining the game they are playing and how they will win that game. The strategy establishes objectives for the business, which prompts identification of a series of initiatives necessary to achieve breakthrough performance. Specific process improvement tools drawn from the set now available within DBS are applied to execute these initiatives. These are put in place with identifiable metrics and responsibilities cascaded through the organization down to front line employees, which are then monitored and variances addressed in monthly policy deployment (PD) review sessions with senior executives (Exhibits 6 and 7).

Whenever an activity is deemed as critical to delivering improved performance, the appropriate tool outlining the detailed process steps to follow, will be deployed, if necessary with the support of the small headquarters DBS office. Methods to drive improvements are drawn from the portfolio of tools that have been built over time. These include not just shopfloor techniques, value stream mapping, lean manufacturing etc but now cover 60 different processes, such as ideation and financial management, that address all aspects of a firm's operations (Exhibit 8). Indeed, students often see Danaher's tools as offering an MBA in "how to execute strategy".

New acquisitions are required to adopt DBS. Indeed, senior management's first task after being acquired is to spend one week training in DBS and then implementing an improvement project in their company. Once comfortable with the process and some of the tools, senior executives become the primary trainers of others.

The extent to which DBS is embedded in the firm is reflected in the visible posting of progress towards PD goals throughout plants and outside every office door. Managers embrace the process, to

⁸ Culp was most recently appointed CEO of GE.

⁹ Investor presentation "Dental Day 2014" 6/24/2014 accessed at <http://phx.corporate-ir.net/phoenix.zhtml?c=82105&p=irol-presentations>

the extent that one passionate advocate employs the same tools in his family with monthly meetings to monitor progress!

Executives believe in the value of DBS and the ability of working together as a team to drive continuous improvement. Indeed when hiring MBAs a group of candidates will be timed passing a basketball among themselves. After the initial effort, they are asked to try to reduce that time again and again until they have convincingly demonstrated there is always room for improvement in any activity! All executives are trained in DBS techniques, typically by other managers since the best way to learn anything is to teach it, and because of their credibility having applied the techniques themselves. Personnel in acquired companies who do not buy into DBS are encouraged to leave the firm. Progress towards deployment of the requisite policies are tracked as output measures, such as percentage of jobs filled from within the firm, as opposed to input measures – I ran three meetings on the importance of hiring from within – and are monitored in PD reviews. In these meetings there is more concern expressed when too many metrics are green than when many are red. Green implies there was limited stretch in the performance improvement target. Reds are an opportunity for improvement that can be collectively addressed as “solving the problem, not blaming the person.” Indeed, when asked what one thing he would take to another company, Larry Culp identified the PD review sessions as most critical for driving continuous improvement in performance.

What makes the system work is that it has now been used throughout the firm for twenty five years, and that top management, who have operated within this system for that period of time, is committed to its usage. This acts both as a carrot and a stick to the rest of the organization. While the use of DBS is mandated, its greatest value is in giving managers the confidence to pursue ambitious performance improvement targets. Managers need not be concerned that changes they implement will not work, that the expense of the exercise will be too high, or that they won't be able to apply the tool - if they just follow the system, everything will work out. At one acquired company, for example, management had been looking for a performance management system to drive strategy execution, but was unsure whether what was being pushed by consultants would work for them. Once owned by Danaher, DBS proved to be the system they had been looking for, but had never had the courage to pursue.

DYNAMIC CAPABILITIES AT DANAHER

That the core of Danaher is DBS and that it represents a dynamic capability in the sense of increasingly higher levels of continuous improvement is perhaps best reflected in the company's own statements. Its website notes, “DBS drives every aspect of our culture and performance. We use DBS to guide what we do, measure how well we execute, and create options for doing even better -- including improving DBS itself.”¹⁰ “The DBS engine drives the company through a never-ending cycle of change and improvement: exceptional PEOPLE develop outstanding PLANS and execute them using world-class tools to construct sustainable PROCESSES, resulting in superior PERFORMANCE. Superior performance and high expectations attract exceptional people, who continue the cycle.” “Over time,

¹⁰ <http://www.danaher.com/danaher-business-system> accessed on 7/2/14

DBS has evolved from a collection of manufacturing improvement tools into a philosophy, set of values, and series of management processes that collectively define who we are and how we do what we do.” This has become a “unique and a clear differentiator for our business because they have been refined over time into an integrated set of values and processes.¹¹” Note the emphases on continuous improvement – a dynamic capability – and the contribution of the passage of “time” to the effectiveness of DBS.

Perhaps more interesting at Danaher is the example of TPS dynamic capabilities in action. Prime among these has been upgrading the attractiveness of businesses in the corporate portfolio. Danaher has continually altered its business mix to be in “fewer, better businesses” (Exhibit 4). In 1985 86% of revenue came from tires and rubber goods. By 1991 78% came from tools and automotive equipment. By 2001 over half of revenues were from Environmental, Electronic Test, and Motion Control platforms, while by 2014 over a third of revenues were from Life Sciences and Diagnostics and the company was calling itself a “Global Science and Technology” company, rather than an industrial goods manufacturer. Along the way, numerous businesses including rubber goods and hand tools had been divested or spun off. Such a dramatic and continuous reshuffling of the portfolio represents a TPS dynamic capability as Danaher is able to move into new high margin businesses while exiting slower growth lower margin businesses in response to evolving market conditions and opportunities. While entry into a new sector is typically through the acquisition of an existing player, Danaher still has to put together a series of add-on acquisitions to build out the platform and focus on developing the resources necessary to succeed in the new sector.

Behind the evolution of the portfolio was the application of Warren Buffet’s principle that “when an industry with a reputation for difficult economics meets a manager with a reputation for excellence, it is usually the industry that keeps its reputation”. Businesses that showed poor or deteriorating industry structure and returns were divested, while Danaher proactively sought to build platforms in industries that met the criteria of market size above \$1 billion; core growth of 5-7%; fragmented with a tail of \$25 -100 million participants that could be acquired; outstanding competitors absent from the industry; tangible, product-centric; and amenable to the application of DBS¹². While these were criteria that any private equity firm might also apply, Danaher was seen as a strategic buyer, even when entering a new sector, because of its ability to improve operational returns through the application of DBS.

The success of the acquisition strategy illustrates the fungible nature of the lower level capabilities that Danaher has built. The very same system and tools can stretch across myriad different businesses and technologies. No change in the system itself is necessary for DBS to add value in new businesses. In fact, CEO Larry Culp believed that DBS could add value to firms in most industries, including CPG and high-technology. At some level, therefore, the demonstrable fungibility of the core DBS capability of continuous improvement is an example of a TPS dynamic capability.

¹¹ Op.cit.

¹² Danaher Corporation case p. 5

In addition, Danaher has continued to improve DBS itself over time. The most obvious example is the increase in number of tools available – which now extend to innovation processes and leadership skills. This can be also be thought of as a TPS dynamic capability, as the process itself is improved and new skills developed and acquired. Upgrading the portfolio of organizational capabilities, therefore, is another TPS dynamic capability since it allows the firm to add and recombine capabilities to meet the demands of the changing markets.

So far, so good! Danaher is an exemplar of how dynamic capabilities of all types can create enormous value. Now for the bad news!

First, and unfortunately for Danaher, while direct imitation of the exact same DBS system might be impossible, the company's performance has led to much imitation. While some might seek to replicate DBS eg Hillenbrand Industries, others are introducing their own versions of a continuous improvement system. At United Technologies a similar system - "achieving competitive excellence" (ACE) - was responsible for half the value created under CEO, George David, according to David himself¹³. ITW, has made an art from the application of the 80/20 principle to everything from the number of SKUs in a product line, to customer segments served, and even the corporate portfolio. While not exactly the same as DBS, such systems represent other idiosyncratic versions of continuous improvements processes, that seek to drive performance from their own version of dynamic capabilities – including some TPS capabilities. As these firms, and to some extent even as private equity firms add "operational" improvements to their armoury of tools to apply to portfolio companies, the rareness of DBS and hence its value begins to erode under the threat of substitution from similar – if not identical – dynamic capabilities.

Second, is the requirement for dynamic consistency in the application of dynamic capabilities. Every innovation or evolution at Danaher to date has left the core of DBS untouched. If circumstances required that Danaher drop DBS or reinvent the entire system in order to compete in a new way, it would lose its ability to execute lower level dynamic capabilities as effectively as it currently does. Each of the elements of DBS, while individually common and pedestrian, have to be aligned in support of the overall purpose of DBS. In this regard, they represent a "Strategy" that cannot be partially changed, but would have to be entirely redesigned if required to go in a different direction. If, for example, Danaher altered its compensation policy or the involvement of senior management in teaching DBS, the entire process would be affected. It is only the twenty five year history of the application of, and consistent adherence to DBS, and the unyielding commitment to and belief of senior management in the system that ensures its adoption throughout the firm. Moreover, if it was known that next year Danaher would no longer be employing DBS because some other technique or system would be utilised, it is unlikely that any newly acquired firm would bother to invest in understanding and applying a technique they might never use again.

The success of effectively building any capability within an organization is predicated on the fact that the capability will not be changed. This requires a commitment that conflicts with the ability

¹³ ACE quote by George David

to continually change capabilities and vividly illustrates the tradeoff between successfully implementing a first order dynamic capability and having a second order capability to change that first order capability. If the dynamic capability required Danaher to throw out DBS, the baby would go out with the bath water!

A third limitation of dynamic capabilities concerns a tradeoff between different types of such capabilities. Since Danaher has never shifted from DBS, the example here is of James McNerney at 3M (Hindo, 2007). On being appointed CEO after a career at GE, he introduced the six sigma process to 3M. While in the position for four and a half years, 3M dutifully applied the methodology and trained many black belts in the process. However, when McNerney left in 2005 one of the first things his successor did was to end the forced application of six sigma because he thought it had gone too far in trading efficiency for the innovation for which 3M was historically known.

The 3M example vividly illustrates the fact that ultimately firms must make a strategic choice about which dynamic capabilities to develop. Under McNerney 3M chose to focus more on efficiency and continuous improvement, and aligned the entire organization around that capability. His successor chose to pursue more of an innovation capability and had to change the entire organization to build this, thus sacrificing some (though not all) the benefits of the earlier six sigma initiatives. (The mapping of this example to exploration versus exploitation is intentional).

There is therefore no TPS dynamic capability that allows the firm to reinvent itself while retaining the original processes and routines that made it successful in the past – unless it is the miracle capability to “always have a competitive advantage”. This does not mean that firms should not aspire to build dynamic capabilities, rather to recognize that they have to choose exactly what sort of dynamic capability they want to build (as applies to strategic decisions about resource investments in general) and to acknowledge that there are tradeoffs with other versions of dynamic capabilities and with lower level capabilities. Aligning the organization behind a capability necessarily involves making choices about compensation and reward systems, organization design, and so on that preclude or constrain the ability to pursue other sorts of capabilities.

INTERPRETATION

The brief overview of Danaher and DBS exemplifies seven important aspects of dynamic capabilities. First, dynamic capabilities do exist and are valuable. The ability to continuously improve operating margins shows how DBS can push out the production frontier in ways that acquired firms were previously unable to do, and that are better than other potential acquirers, including, in many cases, private equity.

Second, it is possible to build a second order dynamic capability, defined as the ability to improve the process of process improvement. At Danaher the tool box of process improvement techniques, for example, is being continually expanded, so that it now includes approaches to generating organic growth rather than just cutting costs. Indeed, some of the newer process tools are of the “how to improve the process of improvement” type. This is an even more desirable capability

since the application of DBS does not result in a one-time jump to the productivity frontier, but in the continual pushing out of that frontier.

Third, in applying the principles of DBS to the corporate portfolio Danaher has migrated the business mix into increasingly more attractive industries while exiting those that show deteriorating industry structure. This is perhaps the best example of DBS as a TPS dynamic capability as the portfolio is adjusted to take advantage of shifting external industry circumstances.

Fourth, dynamic capabilities are built from structuring an entire organization rather than from adopting a limited number of routines ie it is an embedded and path dependent organizational capability. While Danaher's success began with the application of the typical Toyota system lean production techniques on the shop floor, importantly, DBS now consists of an entire system of HR policies, strategy setting, training, monitoring and control systems that combine to ensure that the core techniques are systematically followed. These have been employed in the firm and by the same senior management for nearly twenty five years. This demonstrates that building effective dynamic capabilities requires more than just the naïve application of a few tools but comes from the unique administrative context and design of an organization that has been refined over a substantial period of time.

Fifth, and related, because the capability comes from aligning the entire organization, imitation is difficult – emulation of individual pieces of the system is likely to be less effective. Only replication of the entire system will deliver similar results. Because the system is path dependent such a capability therefore passes the imitation test of a valuable resource. However, it does not prevent other firms substituting their own version of the system – built from their own idiosyncratic and path dependent organizational routines as there is no scarce factor over which companies compete that underpins the capability.

Sixth, there is a limit to the extent to which TPS dynamic capabilities can be employed. In particular, the conflict between the administrative structures required to sustain the current abilities – PD reviews, personnel, visible metrics and so on - and those which would change the entire process, limit any company's ability to pursue higher order TPS dynamic capabilities. There are real tradeoffs between the pursuit of TPS dynamic capabilities and the more mundane lower level routines required to execute any new strategy after a radical shift in direction.

Finally, like any other strategic choice, building a particular dynamic capability involves tradeoffs with other sorts of dynamic capability and with lower level capabilities. As such, companies have to recognize that whichever capability they choose, it will have inherent limitations. Even a dynamic capability cannot solve all problems at once.

CONCLUSION

Both theoretical discussion and the Danaher case illustrate that dynamic capabilities (of both sorts) can be valuable when they meet the VRIN tests for sustainable competitive advantage. While the TPS dynamic capability is, in some sense, more valuable and desirable, it is not the ultimate

competitive advantage. In the first instance, others can replicate its outcomes even if they cannot imitate its specific routines and exact same structures. In fact, the very existence of the capability expands the potential set of competitors against whom one has to be superior. But more importantly, as with the tradeoff between exploitation and exploration there are tradeoffs between levels of dynamic capability. Building a capability that requires throwing out earlier sources of advantage that maintain static efficiency, is likely to undercut any advantage accruing to the pursuit of a new strategic positioning which cannot be effectively executed.

Only the capability to reposition and simultaneously generate an entirely new set of processes to drive lower level dynamic efficiency ie an entirely new variety of DBS would avoid this latter critique. This gets dangerously close to a nirvana where a firm develops the best capability of all - the ability to always have a competitive advantage - which appears from the example of Danaher to be pragmatically unachievable. Unfortunately, as Porter observed, in a world of strategic choices and tradeoffs, building this capability is unlikely, if not impossible.

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EXHIBIT 1

Operational Effectiveness vs. Competitive Positioning

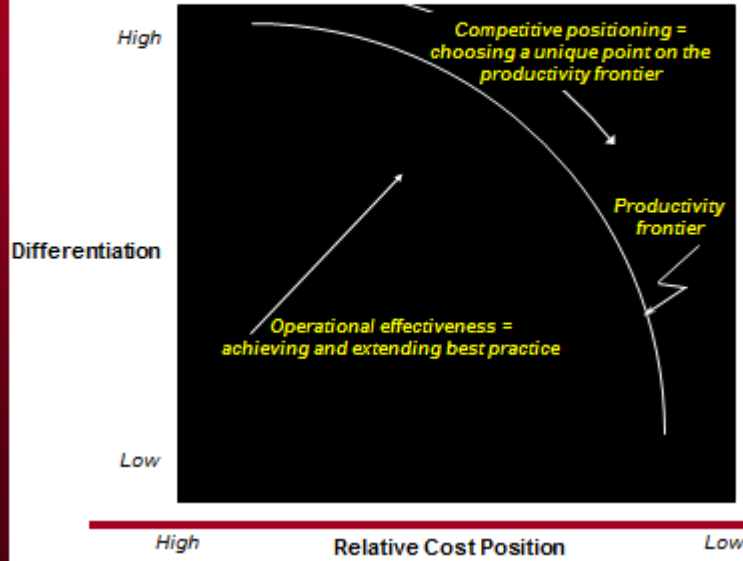
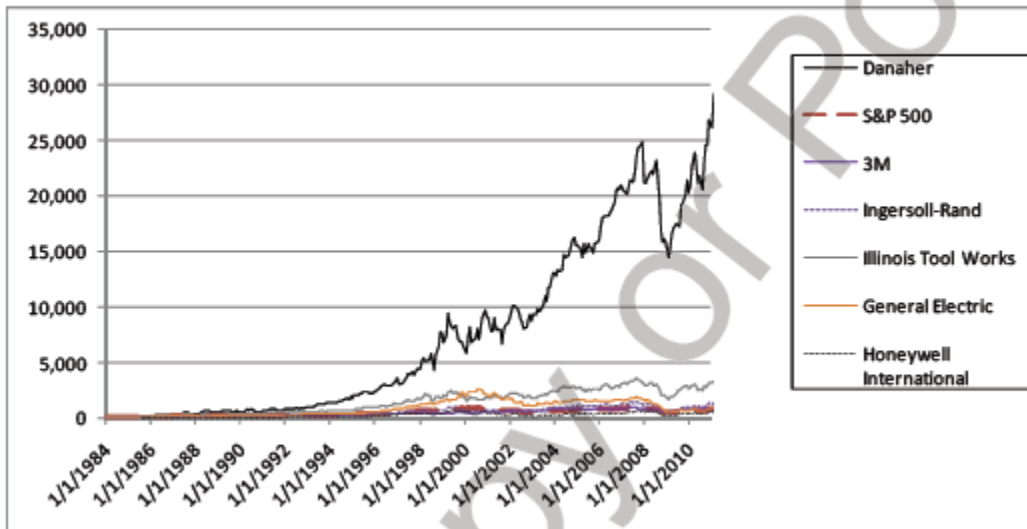


EXHIBIT 2

Danaher Share Price versus S&P and Competitors, 1984–2010 (indexed to 100)



Source: Created by case writers using data from Thomson ONE Banker, accessed April 2011.

EXHIBIT 3

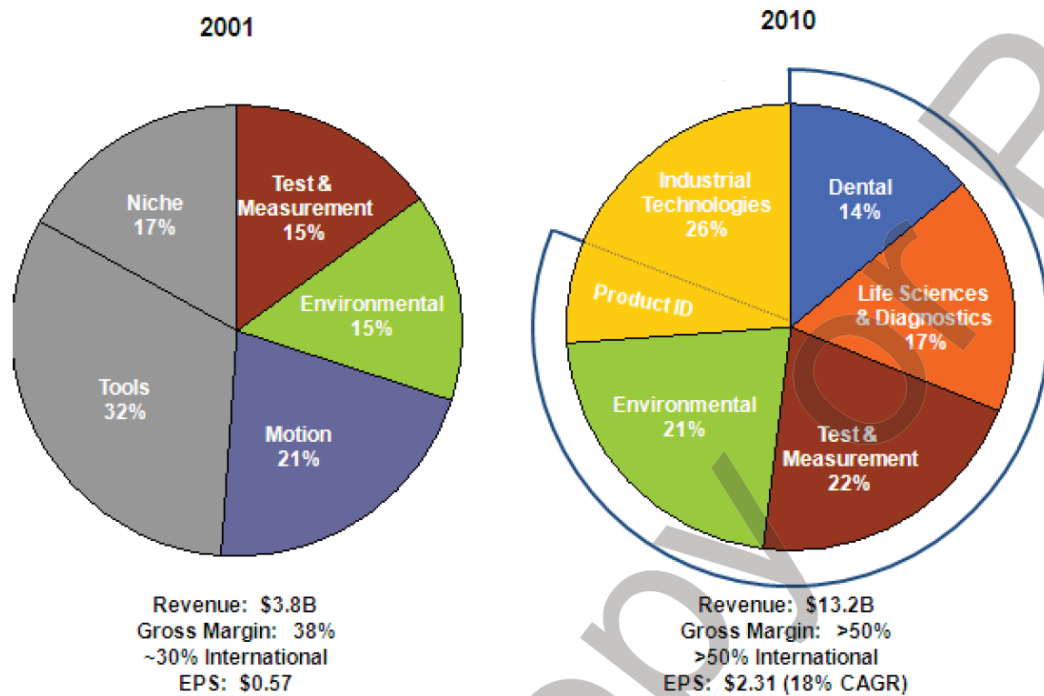
Danaher Annual Income Statement, 1985-2010 (numbers in USD millions)

	1985	1987	1989	1991	1993	1995	1997	1999	2001	2003	2005	2006	2007	2008	2009	2010
Sales (Net)	295.9	616.1	749.1	836.3	1,073.6	1,486.8	2,051.0	3,197.2	3,782.4	5,293.9	7,984.7	9,596.4	11,025.9	12,897.5	11,184.9	13,202.6
Cost of Goods Sold	240.2	406.4	496.1	611.9	758.0	981.1	1,306.4	1,884.4	2,159.6	3,021.4	4,362.7	5,185.8	5,716.5	6,418.0	5,441.3	6,088.7
SG&A	31.6	110.6	136.9	161.6	180.2	266.9	401.6	778.4	872.7	1,316.5	2,160.3	2,730.8	3,246.5	4,070.7	3,706.2	4,483.2
Operating Income Before Depreciation	24.1	99.0	113.1	62.8	135.4	238.8	343.0	584.4	750.1	956.1	1,446.2	1,788.4	1,740.7	1,869.5	1,542.5	2,143.6
Depreciation and Amortization	6.3	13.5	19.1	23.1	35.8	58.5	76.1	126.4	178.4	133.4	177.0	217.2	268.5	339.3	341.6	397.1
Interest Expense	15.9	48.1	27.9	14.5	10.3	7.2	13.1	16.7	25.7	59.0	44.9	79.8	109.7	130.2	122.7	120.8
Interest Income	3.2	5.1	5.7			0.0	0.0	0.0		10.1	14.7	8.0	6.1	10.0	5.0	6.1
Pretax Income	14.0	43.4	79.1	25.3	91.1	173.1	283.8	429.6	476.3	797.0	1,234.4	1,446.2	1,637.1	1,749.3	1,424.9	2,342.7
Net Income (Loss)	13.5	19.0	61.1	18.3	17.7	108.3	154.8	261.6	297.7	536.8	897.8	1,122.0	1,369.9	1,317.6	1,151.7	1,788.0

Source: Standard & Poor's Compustat® data and Company SEC filings.

EXHIBIT 4

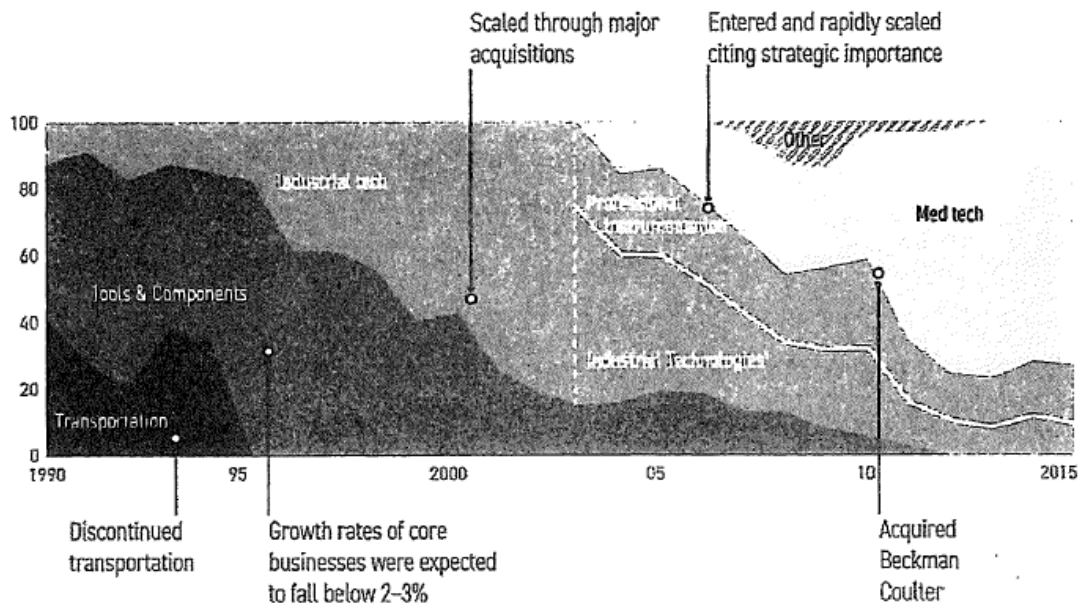
Portfolio Evolution



Danaher's dynamic resource re-allocation

Danaher moved capex aggressively from old to new fields

Share of capex by business unit, percent








¹ The segment was split in 2003 into Professional Instrumentation and Industrial Technologies

Source: Compustat; Annual reports

Strategy Beyond The Hockey Stick, Chris Bradley, Martin Hirt & Sven Smit, McKinsey & Company, 2018, Exhibit 27, Page 155.

Exhibit 5 Operating Margin Expansion of Acquired Companies

		Op Margin year prior to purchase	Current Margins	Improvement
1998		HSD	20%+	+1200 bps
1999		Mid Teens	20%+	+700 bps
2000		HSD	Low DD	+400 bps
2002		MSD	Low DD	+700 bps
2002		Mid Teens	20%+	+700 bps

Source: Company Investor Presentation, December 2005.

EXHIBIT 8

DBS Training Modules

Business Process	Lean, Supply Chain, Variation Reduction Tools	I2E & Growth Tools	Associate Development	Leadership Development
Strategic Planning	5S Visual Mgmt.	(VOC) Voice of the Customer	Introduction to DBS	DBS Immersion
Policy Deployment	Value Stream Mapping	Value Selling	DBS Tool Certification MBB Processes	ECO
Daily Management	Standard Work	Customer Segmentation	DBSL Bootcamp	DBS Leadership Training
Kaizen Event Basics	Model Cell	Accelerated Product Development	Training & Facilitation Techniques	Critical Conversations
Acquisition Integration	(SMED) Set-up Reduction	Product Life Cycle Mgmt	Root Cause/Counter Measure	Interview & Selection training
JIT Accounting	(3P) Production Prep. Process	Project Management	Change Management	Danaher Leadership Program
Accounts Receivable Benchmarking	(TPM) Total Productive Mfg	Ideation	DBSL Continuing Education Workshop	DBS Zealotry Boot Camp
Financial Acumen	Flow/SSI/Standard Work	TG-2 Kaizen		
(IPP) Intellectual Property Process	Lean Conversion Boot Camp	Open Innovation		
	(TPM) Transactional Process Improvement	Pricing Margin Management		
	Heijunka	Sales Force Initiative		
	Lean Conversion Roadmap	Breakthrough Ideation		
		Lean Software Design		
	(DMP) Danaher Materials Process			
	Materials Assessment Tool			
	(PSI) Product Sales Inventory			
	Lean Supply Chain			
	Sourcing Workshop			
	Supply Base Management			
	Commodity Management			
	(VRK) Variation Reduction Kaizen			
	(MSA) Measurement System Analysis			
	(FMEA) Failure Mode & Effective Analysis			
	Six Sigma			
	Supply Chain & Logistics Best Practices			

Source: Company materials.