# Managing Complexity: How to Turn a Problem into a Strength

*Konstantinos G. Apostolatos, Joris Keizers, Libor Kotlik, and Jan Olovsson*

Companies are ever striving for profitability. And in doing so try to reduce the complexity they have been building up during the last years. The crucial question though is how to go about it. Apostolatos, Olovsson, Kotlik and Keizers discuss the various types of complexity and offer three basic ways to address complexity: by eliminating complexity that customers will not pay for, by exploiting to the fullest complexity that customers will pay for, and by reducing to the minimum the costs of any complexity companies offer.

> *"Complexity is the prodigy of the world. Simplicity is the sensation of the universe. Behind complexity, there is always simplicity to be revealed. Inside simplicity, there is always complexity to be discovered."*
>
> *Gang Yu*
>
> *"The point is, you'd better figure out what your customers - the customers you want - value. Because that's what they'll buy. Anything else is a waste of their money, and they'll figure that out in a hurry."*
>
> *Gordon Betune*

What do Procter & Gamble, Toyota, Capital One, Dell Computer, Wal-Mart, Southwest Airlines, Amazon and Easyjet have in common? They have all outperformed or are outperforming their competitors, based on the economic value they have been creating. How did they do it?

One key to the success of these companies is the way they have dealt with complexity. They realised that the complexity of a product or service offering is often a larger drag on profits and growth than any other single factor in a business.

Dealing with organisational complexity has become an ever-increasing pre-occupation of boards of management of multinational corporations in recent years. Driven by business growth, constantly changing customer requirements, globalisation and intensifying competition, complexity is manifested in an ever-broadening portfolio of product services and customers. It permeates the entire value chain and has an impact on every part of the organisation.

Although not inherently bad provided it delivers economic value, complexity requires adjustment in the operating models of companies and needs to be carefully managed. Most companies find it particularly challenging to act effectively on complexity as it means addressing profound

strategic issues that touch every part of the business. Companies that decide to embark on such undertakings need to realise that what is required is a long-term, relentless and disciplined implementation and maintenance effort. But the results of such efforts, if done properly, can be spectacular.

There are three basic ways to address complexity:

1. Eliminate complexity that customers will not pay for;
2. Exploit to the fullest complexity (product or service value attributes) that customers will pay for;
3. Reduce to the minimum the costs of any complexity you offer (preferably by re-inventing the business model).

*Complexity requires adjustment in the operating models of companies and needs to be carefully managed.*

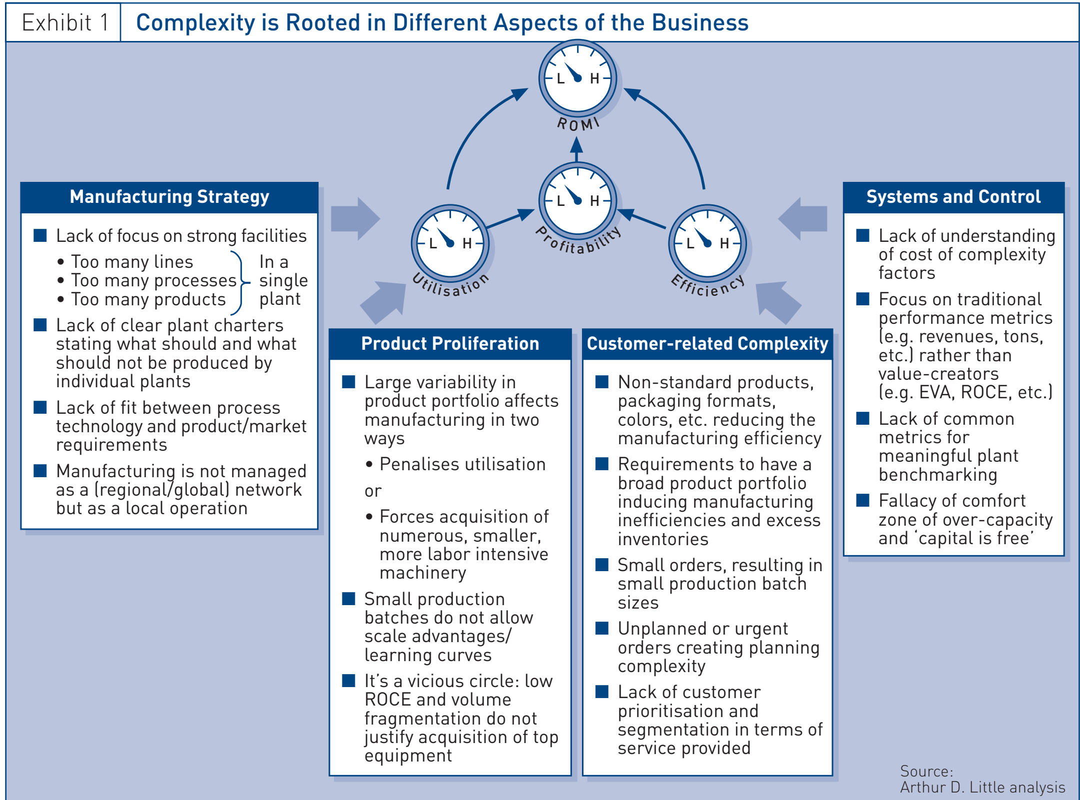
**What is complexity?**

Webster's 1913 Dictionary
Com`plex´i`ty

1. The state of being complex; intricacy; entanglement.
   "The objects of society are of the greatest possible complexity"
   *Burke*
2. That which is complex; intricacy; complication.
   "Many-corridored complexities of Arthur's palace"
   *Tennyson*

The basic drivers of growth in many industries today are diversification and expansion of product and service offering, increased customisation of products, multiple distribution channels, differentiated service bundles, etc. All this comes at a cost, the so-called cost of complexity.

As far as the incremental profitability that results from this added complexity structurally compensates for the additional cost, we speak of "good complexity". The problem, however, is often that adding complexity requires fundamentally adapting a company's operating model in order to prevent the additional costs incurred exceeding the potential financial benefits (what we call "bad complexity").




Large organisations often prove unprepared to confront and control complexity, especially when growth is the result of multiple acquisitions, and often only act to address it when their backs are against the wall.

To discuss complexity, we need to go back to the very basics of strategic theory, which is that there are three generic competitive strategies: cost leadership, differentiation, or focus. All the evidence shows that hardly any firms have won the competitive game without following one of these three generic strategies.

The key underlying message here is that corporations need to make unequivocal and consistent choices on how and where to compete: you simply cannot have both the most innovative/differentiated products and be the cheapest. Easyjet or Ryanair do not pretend to have the best product available; they are providing the best possible value for money.

*Easyjet or Ryanair do not pretend to have the best product available; they are providing the best possible value for money.*

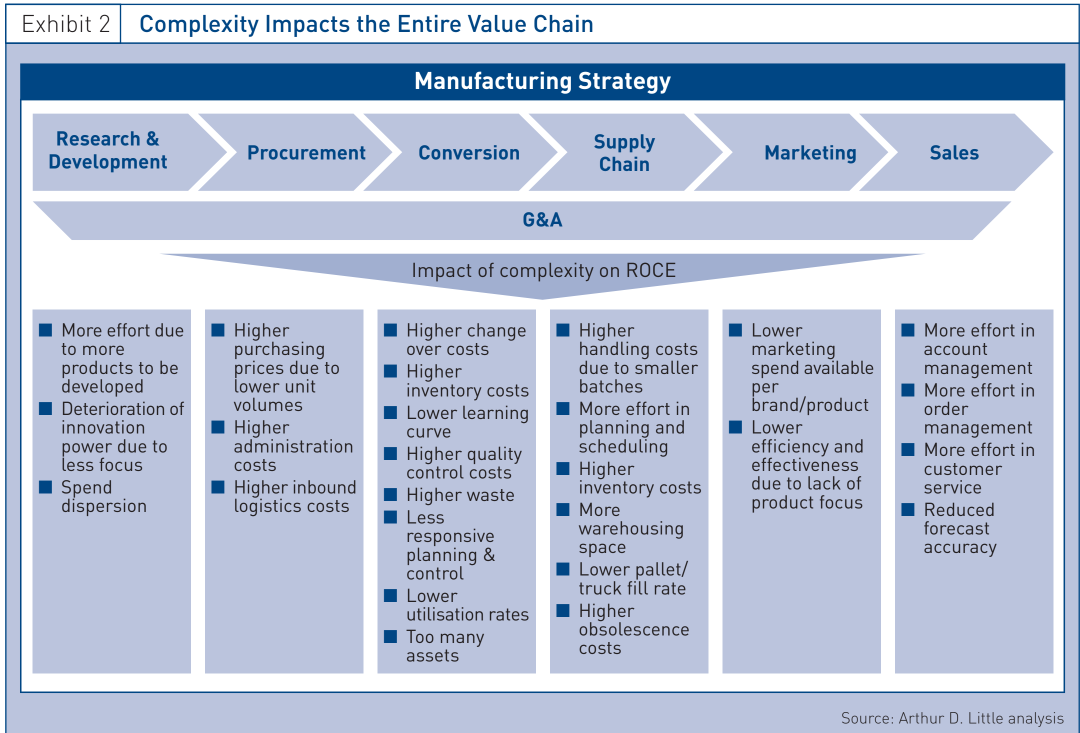
The concepts of scale and cost leadership are closely interlinked, especially in commodity industries where differentiation is very hard to achieve and therefore price becomes virtually the only way to compete. The continuing consolidation in commodity industries (e.g. pulp and paper, bulk chemicals, airlines, textile companies, steel producers) has been an effort to create critical scale and improve these industries' traditionally very low economic returns. Large corporations convinced that size ensures success, however, often struggle to translate size and scale into customer value and profits. The main reason is that they often fall into the so-called "commodity trap", whereby they try to reverse a (customer-driven) trend of commoditisation in their industry by adding complexity. However, as we have already mentioned, complexity usually impedes efficiency, unless the operating model is unique.

As a general rule, trying to differentiate in an industry driven primarily by price considerations is a very costly strategy. There are, of course, exceptions to this rule but

**Southwest Airlines: designing out complexity**

The low level of complexity at Southwest Airlines has made it possible for the company to achieve low labor cost. The company has low complexity by design, operating only Boeing 737 aircraft. American Airlines, in contrast, has historically supported a great deal of internal complexity, operating as many as 14 aircraft types to address what it regarded as different markets with different needs. Because, among other factors, Southwest has a far faster and more reliable landing/take-off turnaround time, it can generate profit much more quickly than American by making more revenue flights per day per equipment investment per unit. Southwest has designed out the complexity that customers won't pay for. The difference in American's cost structure stems from having 14 kinds of aircraft, which means 14 spares depots, 14 kinds of mechanic and pilot training, 14 kinds of FAA certification and the cost of an information factory to schedule and maintain it all... none of which adds value to the customer.

Exhibit 2 Complexity Impacts the Entire Value Chain




Source: Arthur D. Little analysis

they only work because of exceptionally smart business models, which still take advantage of scale effects.

On the other hand, when the basis of the business is differentiation, complexity still needs to be managed but is often compensated for by enhanced margins.

As illustrated above, complexity is something that touches every part of the value chain of a company, from research and development all the way to sales and after-sales.

## Types of Complexity

Complexity is the result of strategic choices and can relate to various business dimensions, such as:

- *Brand and product portfolio;*
- Marketing mix and pricing;
- Supply and supplier base;
- *Customer and supply chain complexity;*
- *Innovation (R&D) and technology;*
- IT architecture.

**IKEA: efficiency with variety**

IKEA has quickly evolved from a local Swedish home furnishing manufacturer into the largest home furnishing company in the world. The basic premise of its business model is to build mega-stores with very efficient layouts and therefore create an engaging shopping experience for its customers. IKEA does not attempt to limit variety; rather, it thrives on variety and above-average quality. However, its business model essentially relies on low cost: through high space utilisation efficiency, partly through persuading its customers to perform the transport and assembly processes of the furniture manufacturing value chain, and through a high degree of standardisation of spare parts and tight control of the supplier base. It has executed its strategy by building a worldwide sourcing network of high-quality global manufacturers to support its growth.

Although in this article we focus on only a few of these dimensions (the ones in italics), one can see that these are often closely interlinked and rather strategic in nature.

### 1. Brand and product portfolio complexity

> *"... in the most developed economies of the twenty-first century, the next generation of positioning success will belong to those brands that relieve customer stress. That means simplifying customers' lives or business in ways that are inextricably tied to brand and product positioning"*
>
> *(Steven M. Cristol, Peter Sealey: Simplicity Marketing, Page 2, 2000.)*

*Multiplicity of brands facilitates responsiveness to specific customer or segment needs and clear product differentiation, but often leads to fragmentation and lack of cost efficiency*

The majority of multinational firms own a variety of national, regional and international brands, across a broad range of country markets. Typically, these brands differ in their relative market strength, image, market segment and product portfolio, both within and across markets. Firms such as Sony, IBM or Philips focus on branding at corporate level. Others such as Beiersdorf mostly have brands at the product business level, such as Nivea and Juvena, while yet others, such as P&G, have primarily product level brands.

Multiplicity of brands facilitates responsiveness to specific customer or segment needs and clear product differentiation, but often leads to fragmentation and lack of cost efficiency. Global firms are often faced with the issue of the necessary degree of brand coordination or standardisation across countries. An important question is often whether to use the same brand name in different countries, leveraging brand strength across boundaries, or whether to focus on local brands responding to local customer preferences. The European market is an excellent case in point, in which even in highly commoditised product categories, the (perceived and real) differences in consumer preferences from one country to another often make it impossible to create economies of scale. A uniform brand across countries may have the advantage of enhancing visibility and reach but could also backfire as it may have negative connotations in some markets or result in lack of adaptation to local market conditions and the competitive environment.

Historic reasons and growth strategies often explain the brand portfolio of a given corporation. Some firms, such as P&G, have expanded through leveraging strong domestic brands in international markets. Consequently, as they seek to expand further, they have to consider whether to develop brands geared to specific regional or national preferences. Others, such as Kraft and Nestle, have traditionally adopted country-centered strategies, building or acquiring a mix of national and international brands. Such companies face the difficult decision of whether or not to move towards greater harmonisation of brands and integration of their brand architecture across countries and, if so, how. Furthermore, if the company expands through acquisition or strategic alliances, the question of whether and how brand architectures of different

**Unilever: growth through brand reduction**

The main objective of Unilever's "Path to Growth" programme was to structurally improve overall return on capital employed while enabling a more focused growth strategy. The decision was made to focus on only three key categories - foods, personal care and home care - and to reduce the overall number of brands from more than 1,600 to 400 in the process. The programme has targeted overall benefits of over € 4 billion by the end of this year. In the process, operating margins have already jumped from 11 percent to over 16 percent, while the ratio of fixed assets and operating capital to sales has gone down from over 25 percent to around 15 percent.

firms are merged arises. In particular, how far and in what way branding structures are integrated or harmonised across countries has to be determined.

Brands are often the starting point for addressing complexity, as illustrated by the example of Unilever, which embarked in the year 2000 on an ambitious programme called “Path to Growth”.

The next level of complexity within brands is that of the product portfolio. Product specification proliferation develops in many different forms such as different raw materials/basic product formulas, colours, formats and finally - something that is often underestimated - packaging formats. All of this leads to an explosion of stock keeping units (SKUs) with very significant costs of complexity associated with it.

*Product portfolio complexity results in manufacturing complexity, because of the need to produce many different variants, often on dedicated lines, or otherwise on lines which need to be changed over too often.*

Consider the following example of a company in the consumer paper industry. The company had grown in Europe through several acquisitions, having amassed hundreds of local brands in a highly commoditised product segment. The company was highly fragmented throughout the value chain. For a very simple product it had more than 50 brands, with more than 2,000 SKUs, and was manufacturing the product in eight different sites throughout Europe. Its main competitor, on the other hand, had two brands, 150 SKUs and two manufacturing sites. As a result, the company was trailing its competition by almost 8 percentage points in terms of return on capital employed.

Product portfolio complexity results in, among other things, manufacturing complexity, because of the need to produce many different variants, often on dedicated lines, or otherwise on lines which need to be changed over too often. This usually leads to a very low production line utilisation, such as in the example above in the consumer paper industry, where the average converting line utilisation before de-complexity was a mere 31 percent across Europe.

In a primarily price-driven market such as the product category illustrated in the above example, efficiency through standardisation and a world-class supply chain are the only ways to compete. Keeping it simple lowers the cost base and allows for focused innovation. As a result of de-complexity in that example, the product portfolio in terms of the number of SKUs was reduced by over two-thirds, with only 2 percent loss of revenues but with a twofold increase in bottom-line profitability.

**Toyota: flexibility without complexity**

Toyota has long used a complexity-reduction strategy known as standardisation to reduce waste in products and processes and enable it to produce nearly one million variants of vehicles with the minimum of difficulties. This way of working is applied through the entire process, from product development through manufacturing to sales. Toyota uses standardisation techniques to minimise complexity, but it has never eliminated complexity at the expense of the customer's desire for quality and variety. Within 200,000 total monthly units of production, approximately 40,000 variants are actually produced, at or near the lowest cost in the world. Despite this complexity of product, which is valued by customers, the internal complexity and cost at Toyota are far less than at Ford or GM. It builds its complete variety of products on just 13 platforms - foundational designs that can easily be customised to specific products. Each platform in turn derives its sub-assemblies and parts from a book of standardised designs, each of which is used across many platforms.

There is obviously nothing wrong with having a large product range, to the extent that the overall profitability generated offsets the additional cost of complexity. As we have said, this can be achieved with "smart business models", that are able to take up product offering complexity without sacrificing cost efficiency, such as Dell's, which allows customisation but also lower prices due to direct distribution. In high-margin industries such as medical systems and cosmetics, on the other hand, product portfolio proliferation is a key source of competitive advantage.

**2. Customer and supply chain complexity**

It is always an interesting test when we ask board members of different multinational companies to answer a few simple questions:

- Do you agree with the statement that "the customer is always king"?
- Do all your customers deserve to receive the same service for the same price?

- Are the incentives of your sales force driven by revenue or profit?

The answer to such questions is less obvious than one may think. Customer-related complexity is caused by the large variety thereof in a company's customer base (i.e.

**Capital One: using complexity as an advantage**

The dynamics of some markets reward the creation of a highly complex offering if it can be delivered at a cost that provides an attractive value proposition. The credit card company Capital One noticed that most credit cards were issued at zero complexity: a single offering with an interest rate of 19.8 percent regardless of the creditworthiness of the customer. Its competitors acted as though the market only needed one product to fit all risk profiles. Thus customers with good credit profiles paid a high rate and generated a handsome return to the banks.

The cost of customers with bad creditworthiness was borne by good customers, was "non-value-added" in Capital One's view, and created a market opportunity for a differentiated and highly attractive offering. By building up private databases of credit information and developing proprietary algorithms, Capital One was able to tailor a significantly lower rate (e.g., 6 percent) for lower-risk cardholders, and to deny credit to higher-risk applicants. Its investment in technology resulted in a low-cost way of offering high levels of complexity. By the third ring of a customer phone call, the computer recognises the customer's telephone number, identifies the most likely reason for calling, routes the call to the right clerk, and then populates the clerk's computer screen with products and services that the caller may be interested in purchasing.

Complexity cost is low due to smart investment in information technology. This increased complexity provided a highly desirable offering, and afforded Capital One a 40 percent compound growth rate per year with the highest ROE and lowest charge-off rate in the industry.

**Fidelity: focusing the customer base**

Fidelity Investments, the world's largest mutual fund company, saw how some customers were unprofitable because of the channels they used. So it put in place an automated phone system that identified unprofitable customers and routed them into longer queues, allowing its staff to serve more profitable customers faster. If the unprofitable customers switched to lower-cost channels, such as the internet,they became profitable. If they didn't like the new experience and left, Fidelity became more profitable without them.

large vs. small, local vs. global, "easy" vs. "demanding"), often causing havoc in the supply chain.

Simplifying an offering portfolio is one way to maximise value; simplifying your customer portfolio is another. An unprofitable customer is not necessarily just the one that simply buys an unprofitable product.

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But it is not always as simple as that: for instance, unprofitable customers may be expensive because they make very irregular purchases, pay slowly, demand an extra level of service, do not pay on time, cause a lot of additional effort for customer service and the like. Or they may be unprofitable because they inherently see less value in your offerings compared with your profitable customer set.

It was this concept that led FedEx to classify its business customers into three types based on profitability: the good, the bad and the ugly.

A company in commodity chemicals was making more than 80 percent of its sales and over 90 percent of its profit from less than 5 percent of its customers - a classic "Pareto" distribution. A long list of customers were "unprofitable" at current pricing levels and customer service conditions. Introducing a differentiated "bundled" approach to product offering, pricing and service level meant that "the bar was raised", for example for cus-

*Zara and Ebay: Complexity with Profitability*

**Zara: setting a new fashion**

Founded in 1963 as a maker of ladies' lingerie in the Galician town of La Coruna, Zara today is the centrepiece of Inditex, a holding company for five fashion chains.
At the heart of Zara's success is a vertically integrated business model spanning design, just-in-time production, marketing and sales. This gives the group more flexibility than its rivals in responding to fickle fashion trends. Unlike other international clothing chains, such as Hennes & Mauritz (H&M) and The Gap, Zara makes more than half of its clothes in-house, rather than relying on a network of disparate and often slow-moving suppliers. H&M, for instance, buys clothes from more than 900 firms.
Starting with basic fabric dyeing, almost all Zara's clothes take shape in a design-and-manufacturing centre in La Coruna, with most of the sewing done by seamstresses from 400 local co-operatives. Designers speak daily to store managers to discover which items are most in demand. Supported by real-time sales data, they then feed repeat orders and fresh designs into the manufacturing plant, which, in turn, ships the desired items directly to the stores twice a week, eliminating the need for warehouses and keeping inventories low.
The result is that Zara can make a new line from start to finish in three weeks, against an industry average of nine months. It produces 10,000 new designs each year; none stays in the stores for over a month.
Moreover, Zara's business model makes it highly price-competitive, allowing it to offer mid-market chic at down-market prices. And it protects against slip-ups too. Whereas most retailers have committed 60 percent of their production at the start of a season, the figure at Zara is 15 percent, so it is easier to dump a range that turns out to be unpopular.

tomers who ordered small batches of non-standard products, expecting fast deliveries. Furthermore, the production orders of larger customers were streamlined in such a way that production scheduling became much more constant, thus increasing the stability of the operation and saving cost in the process.

### 3. Innovation (R&D) and technology complexity

Another key challenge of major corporations is to manage the fast proliferation of technologies and to focus innovation efforts for maximum effectiveness. Complexity manifests itself in all stages of the innovation process, which ultimately impedes the corporate ability to invent and to bring new products rapidly to the marketplace.

Many companies struggle with the classic issues of poor market intelligence, fragmented and unfocused idea generation processes, a vast and often uncoordinated project and technology portfolio and the like.

**eBay: a business like no other**

Consider eBay's official mission statement: "eBay's mission is to provide a global trading platform where practically anyone can trade practically anything."
With such a mission, one would have imagined that there would be an enormous amount of complexity. eBay has already become the world's largest marketplace, with more than 115 million users, trading in more than 40 main product categories (and, stunningly, over 40,000 sub-categories) with over $3 billion in revenues and 35 percent operating profit. Its market capitalisation is currently close to $40 billion.
However, eBay does not carry any inventories, nor does it send out invoices. It has created an enormous and rapidly expanding global community through "viral marketing", where everything can be traded. To some extent one can say that eBay does not have any real competition, except for traditional retailers.

Top-performing innovators, on the other hand, have developed very efficient and holistic approaches to innovation and focusing the innovation pipeline on those things that are expected to deliver very measurable customer value.

## Complexity with Profitability: the Golden Combination

We have been talking a great deal about restructuring the portfolio of brands, products and customers, increasing the focus of R&D and the like. However, there are some

companies that manage to maintain complexity (with respect to accommodating a large portfolio of products and service offerings), while at the same time achieving very high levels of profitability. How do they do it? By re-inventing the way business is done. Two great examples illustrate the point: Zara and Ebay.

### Insights for the Executive: How to Get it Right

Our experience shows that, despite all of the arguments discussed above, companies often find it very difficult to embark on the journey to deal with complexity. Here is why: There are no “quick fixes”. Addressing complexity is daring to make some very tough fundamental decisions about how to compete in the marketplace. Making these choices is not enough, however; following through in a disciplined manner is equally important. Unilever is already more than four years into its “Path to Growth” programme and many challenges still remain, despite the impressive results so far.

However, our own experience with such undertakings allows us to provide some tips. In this article, we have talked about three basic ways of effectively managing complexity: elimination, leveraging or adapting the business model.

Exhibit 3 **Several Challenges Must be Resolved to Achieve De-Complexity Benefits**

| Understanding complexity and how to reduce it | Getting organisational alignment and buy-in | Managing large scale change | Avoiding future complexity |
|---|---|---|---|
| ■ Dynamic links / mutual interdependencies between all parts of value chain<br>■ Difference between value-adding and value destroying complexity<br>■ Trade-offs between revenue at risk and costs<br>■ Different cost types and their behaviour with various complexity levels<br>■ Market and customer related complexity | ■ Across functional lines (e.g. marketing and manufacturing)<br>■ Between national and pan-European perspectives<br>■ Magnitude of impact (product, plants, customers)<br>■ Existing paradigms may be challenged<br>■ Exercise is viewed as pure restructuring | ■ All value chain steps are concerned<br>■ All countries are involved<br>■ Providing consistent and adapted communication to various stakeholder groups, external and internal<br>■ Maintaining implementation momentum in a difficult marketplace<br>■ Maintaining strategic direction vs. managing the details required for results | ■ Measuring complexity KPI’s<br>■ Putting a complexity maintenance process in place |

Source: Arthur D. Little analysis

What is absolutely crucial is to understand that a holistic approach is needed which starts by addressing the fundamentals of how a company wishes to compete and which is its business model for success. Following fragmented, half-hearted approaches simply does not deliver results (e.g. downsizing the portfolio without thinking through the implications or shutting down plants without reducing product complexity). It is equally important to realise that these kinds of undertakings require a sustained long-term effort, way beyond addressing "low-hanging fruit". A number of key principles are illustrated in Exhibit 3 and 4.

Although it is not always easy to consistently measure the results of companies which have embarked on such operations over a long period of time, we have consistently found that the results can be very substantial.

What is very important to understand, as the experiences of many companies have shown, is that such programmes are not only about reducing cost and rationalising the capital base (e.g. plant closure, working capital reduction). They actually provide for the necessary free cash flow, which then becomes the key driver of focused growth. It would be both intellectually as well as psychologically wrong to position complexity management therefore as "another cost-reduction exercise".

Exhibit 4 **To Succeed in Addressing Complexity a Number of Key Principles Must be Followed**

| Understanding complexity and how to reduce it | Getting organisational alignment and buy-in | Managing large scale change | Avoiding future complexity |
|---|---|---|---|
| ■ Use proven holistic and fact-driven approach<br>■ Make trade-offs explicit and visible<br>■ Understand that cost reduction is the "fuel to growth", not just an end in itself | ■ Install cross-functional teams<br>■ Define complexity management business case<br>■ Provide long-term perspective for key people & right incentives<br>■ Involve key stakeholders in decision making process<br>■ Be consistent in communication<br>■ Create early wins + "champions"<br>■ Link benefits to MBOs/ budget | ■ Install professional programme management and slowly transit to regular organisation<br>■ Create clear communication strategy<br>■ Measure progress vs. target | ■ Institutionalise product creation / elimination process<br>■ Continuously monitor portfolio performance<br>■ Perform regular "clean-up" of "worst X%" of portfolio<br>■ Ensure costing system is appropriate for managing complexity<br>■ Continuously benchmark vs competition |

Source: Arthur D. Little analysis

Typical results involve overall improvement of the return on capital employed of several percentage points. In a recent example in the process industry, return on capital employed climbed from 7 percent to 15 percent in three years, resulting from improvements of the nominator (operating cost reduction and revenue growth), and the denominator (substantial improvements in working capital and reduction of fixed assets).

So what is the starting point for senior executives? It is recognising and analysing issues that are usually taboo within the corporate culture (e.g. the marketing mix, the manufacturing and supply chain network, the way innovation takes place) from the perspective that you are in business for the sole reason of producing sustainable long-term economic gains.

Managing complexity can therefore be a key lever for creating economic value. Senior executives must be prepared, however, to make bold strategic decisions and persist with disciplined implementation if they are determined to reap the benefits.

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