

# Moving from Strategic Measurement to Strategic Data Analysis

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Management control theories argue that the key goals of strategic control systems are communicating strategic direction and priorities, developing mechanisms for determining whether the chosen strategy is achieving its objectives, and providing information that can be used to modify actions in order to achieve desired goals. As discussed in other chapters, the initial development of strategic control systems requires the firm to determine the system's primary objectives (Hansen and Mouritsen 2005), allocate resources to achieve these objectives (Miller and O'Leary 2005), and develop formal and informal control systems for guiding and evaluating routines and practices for consistency with strategic goals (Ahrens and Chapman 2005). While choices regarding system objectives, resource allocation methods, and specific performance measures are all critical issues in strategic control system implementation and success, an equally important issue is establishing the organizational mechanisms needed to promote ongoing analysis of strategic success and encourage strategic learning. Although management control literature argues that such 'feedback loops', 'double-loop learning', and 'strategic data analyses' are critical components of strategic control systems (e.g. Schreyogg and Steinmann 1987; Kaplan and Norton 1996; Julian and Scifres 2002), relatively little is known about *how* these strategic analysis mechanisms influence strategic control system design and effectiveness. Moreover, despite growing evidence that greater use of these mechanisms is associated with higher perceived measurement system success and improved financial performance (Sandt et al. 2001; Ittner and Larcker 2003; Marr 2004), surveys indicate that most companies with strategic performance measurement systems *do not* perform these analyses (Gates 1999; Ittner and Larcker 2003; Ittner et al. 2003), raising important questions about the factors that promote or hinder their use and effectiveness.

Over the past decade, we have investigated these issues in a variety of contexts, ranging from the measurement of quality improvement initiatives and customer satisfaction programmes to the development of balanced scorecards (BSC) and executive dashboards. In this chapter,

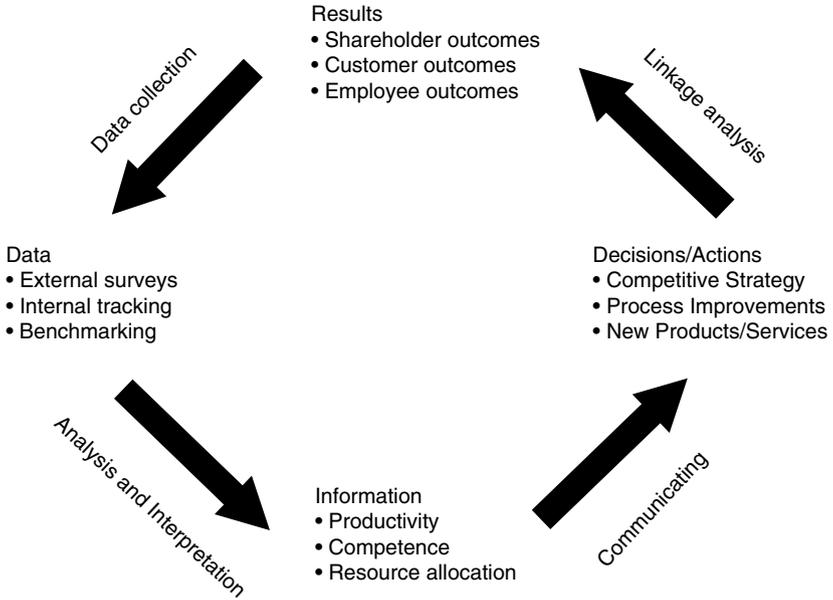
we synthesize our findings on the potential benefits from accompanying strategic performance measurement systems with ongoing strategic data analysis, and discuss some of the technical and organizational factors hindering the development of effective strategic data analysis mechanisms.

## **The roles of data analysis in strategic control systems**

Simon's classic study of the controllership function (Simon et al. 1954) identified three roles for accounting information: attention directing, scorekeeping, and problem solving. Similarly, the strategic measurement and control literature describes three analogous roles for these systems: (a) communicating strategic direction and priorities, (b) determining whether the strategy is being implemented as planned and the results produced by the strategy are those intended, and (c) providing information that can be used to promote organizational learning, to identify avenues for improving strategic performance, and to adapt the strategy to emerging conditions.

According to this literature, data acquisition and analysis are critical elements in strategic measurement and control system effectiveness. A representative strategic data analysis process, developed by one of our research sites, is illustrated in Figure 1. Lorange et al. (1986) contend that 'strategic controllers' should undertake such a process in order to better understand the underlying drivers of strategic results. Julian and Scifres (2002) argue that data analysis and interpretation are essential in facilitating the identification of factors that trigger the need for strategic change. Schreyogg and Steinmann (1987) point out that the very premises underlying the strategy being communicated to the organization are based on assumptions that must be verified through data analysis. In a similar vein, Kaplan and Norton (1996) emphasize that the 'strategy maps' communicating how improvements in chosen BSC performance measures are expected to produce strategic results are merely hypotheses that need to be tested.

Assessment of implementation and strategic success, in turn, requires the development of valid and reliable measures for the hypothesized key success factors (e.g. what *specific* measures and measurement methodologies actually tell us whether we are achieving our implementation goals or strategic objectives?), the weighting of different types of measures (e.g. how do we 'balance' short-term goals against longer-term



**Figure 1** Strategic data analysis process

strategic objectives?), and the identification of performance standards for the hypothesized success factors (e.g. do we want to maximize performance on every dimension, i.e. every customer or employee is 100 per cent satisfied or loyal, or is some other performance standard more appropriate?). These assessments require analysis of available data, or the gathering and interpretation of new data when the existing system does not provide the information needed to examine these issues (Muralidharan 1997; Ittner and Larcker 2003).

Finally, the use of strategic measurement systems for decision-making and learning purposes requires organizations to undertake increasingly detailed data analyses to uncover the underlying drivers or root causes of strategic success, the potential benefits from specific strategic investments, and the reasons behind deviations from strategic targets (e.g. Argyris 1982; Hayes et al. 1988; Kaplan and Norton 1996; Julian and Scifres 2002).

To examine these potential uses and benefits in greater detail, we conducted extensive field research in more than sixty companies, and supplemented this field research with survey-based studies in a broad spectrum of public-and private-sector organizations. Our research identified three primary benefits from strategic data analysis, including

enhanced communication of strategic assumptions, better identification and measurement of strategic value drivers, and improved resource allocation and target setting. The following examples illustrate the role of strategic data analysis in achieving these benefits.

### **Strategic marketing metrics in a convenience store chain**

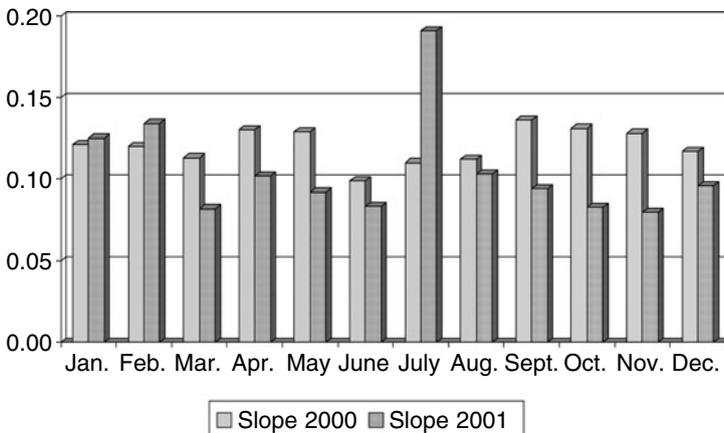
Although most companies make some effort to tie their performance measures to the organization's strategy, these links are often based on management intuition or organizational folklore about these relations rather than rigorous analysis. A study of strategic performance measurement systems by the Conference Board (Gates 1999), for example, found that 69 per cent of companies attempt to determine the associations between their performance measures and the organization's strategy when choosing performance measures, but only 22 per cent assess these links in a rigorous manner.

One important reason for the intuitive approach to choosing performance measures is the absence of any formal attempt to understand how the company's various financial and non-financial measures are expected to fit together or produce desired strategic results. Many proponents of strategic performance measures argue that companies should develop causal 'business models' or 'value driver maps' that articulate the cause-and-effect relations among performance measures, and show how improvements in these measures are expected to improve long-term strategic and economic performance. However, less than 30 per cent of the companies we surveyed have developed these strategic 'business models' or 'value driver maps', and even fewer actually test whether the *specific* performance measures they have chosen are associated with expected results. In fact, only 21 per cent of the companies we surveyed even attempt to demonstrate that improvements in their strategic performance measures actually influence future financial results.

Typical is a large retailer in the US. The company owns and operates hundreds of convenience stores that sell gasoline along with various food and convenience items. A number of unarticulated assumptions underpinned its strategic plan and performance measures, with little or no attempt to determine the validity of these assumptions. One of the most firmly held assumptions was that gasoline sales and food sales were unrelated. Rather than seeing these as complementary product lines

that offered cross-selling opportunities, the company saw their joint sale as an opportunity to increase the utilization of fixed resources. When we questioned a wide variety of managers at different organizational levels about this assumption, each asserted that no one had ever found a relationship between gasoline sales and food sales. However, when pushed, no one could tell us where this analysis was or who had done it.

Based on the assumption that gasoline and food sales were unconnected, each product line was set-up as a separate profit centre. Marketing decisions across the two profit centres were not coordinated, and the performance measures reported to one profit centre manager were not reported to the other. When we subsequently analysed the company's data, we found no support for this key strategic assumption. As shown in Figure 2, gasoline sales were highly correlated with food sales. Given the higher profit margins on food sales, these results suggested the potential to reduce gasoline prices (and increase gallons sold) in order to increase profits through food sales. For example, by reducing gasoline prices below those of nearby competitors, the stores could attract more gasoline buyers, who were then likely to buy high-margin food products during the visit. The net effect would be an overall increase in store profitability. In contrast, under the existing strategic assumption that gasoline and food sales were independent, prices on low-margin gasoline would never be reduced below that of competitors unless the resulting increase in volume had a *direct* effect on gasoline profits, with no consideration given to spillover effects on other products.

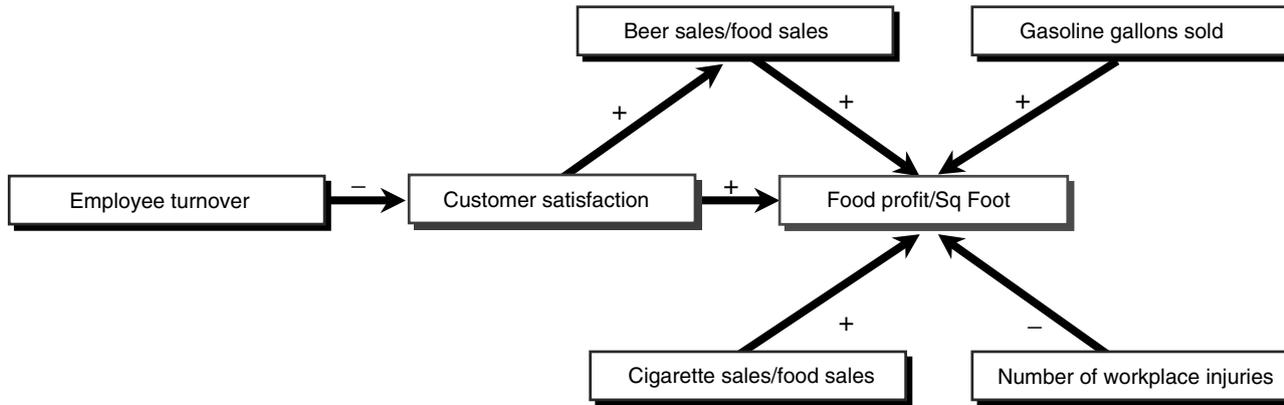


**Figure 2** Estimated elasticities from cross-sectional regressions of convenience store food sales (\$US) on gasoline sales (gallons)

Additional analysis also found that the elasticity between food and gasoline sales varied with factors such as store size, location, and time of year, providing information that allowed the company to tailor its strategic pricing policy. For example, in settings where gasoline and food sales were highly interdependent, it made economic sense to reduce gasoline prices (and therefore gasoline profitability) in order to increase higher-margin food sales and overall store profits. The expected return from each one penny drop in prices could be calculated based on the estimated increase in food sales and profits for each store, providing information on the optimal trade-off between gasoline profitability reductions and increased food profitability. Conversely, in settings where gasoline and food sales were unrelated, the existing practice of pricing the two product lines independently could be retained.

The results from these analyses prompted the company to explicitly articulate and analyse some of its other implicit strategic assumptions. These included the belief that the only factors explaining food profitability were store location and the sales of beer and cigarettes. To assess the attractiveness of a given store location, the company used a scoring model developed by a consulting firm that weighted factors such as income level, traffic patterns, and competition into an overall index of location desirability. Employee measures were not considered important to store profits, and were not reported to the gasoline and food profit centre managers.

Analysis of this broader strategic model of food profitability provided only partial support for the company's beliefs. Consistent with their expectations, the resulting statistical model (shown in Figure 3) indicated that food profitability was positively related to beer and cigarette sales. That is, stores that sold more beer and cigarettes as a percentage of total food sales had higher food profitability due to the higher margins on these two product lines. However, gasoline sales continued to predict food sales profitability, as did employee measures such as turnover and workforce injuries, which were believed to have no effect on store performance. Higher employee turnover had an indirect effect on food profitability through its negative impact on customer satisfaction (as measured using 'mystery shopper' results). The number of workplace injuries, on the other hand, exhibited a direct negative effect on food profits, reflecting the impact of poor working conditions on employee safety and morale. In contrast, the store location index had no ability to differentiate food (or store) profitability, even though the company used this index for assessing new store locations and closing existing stores. While some of the individual location factors, such as the



Notation: +/- refers to a strong statistical positive/negative link;  
 insignificant links are not reported  
 (precise numbers are not reported at company request)

**Figure 3** Analysis of the drivers of food sales profitability in convenience stores

number of parking spaces and market demographics, later proved to have an influence on profitability, the aggregated index used for decision-making lacked any predictive ability.

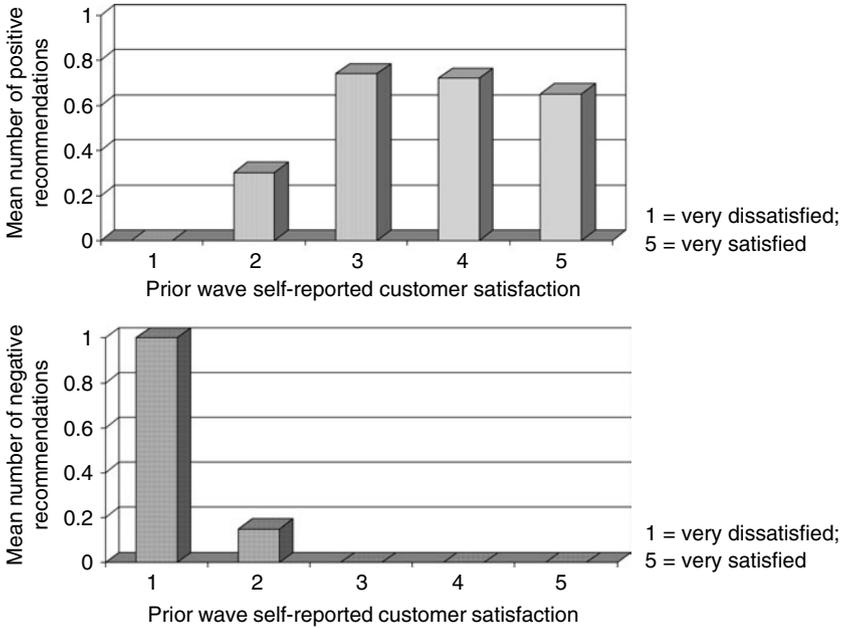
Based on strategic data analysis, the company was able to justify marketing, training, and other initiatives that were previously difficult to justify on a financial basis. Strategic initiatives began to be focused on activities with the largest economic benefits (e.g., employee turnover and injuries), and the results provided a basis for selecting valid performance indicators for assessing store performance.

### **Target setting in a computer manufacturing firm**

Any control system requires targets to determine success or failure. Many companies we studied followed a 'more is better' approach when setting targets for non-financial measures such as customer satisfaction. However, this assumption causes serious problems when the relation between the performance measure and strategic or economic performance is characterized by diminishing or negative returns. Without some analysis to determine where or if these inflection points occur, companies may be investing in improvement activities that yield little or no gain.

Such was the case with a leading personal computer manufacturer. Like many firms, the company used a five-point scale (1 = very dissatisfied to 5 = very satisfied) to measure customer satisfaction. One of the primary assumptions behind the use of this measure was that very satisfied customers would recommend their product to a larger number of potential purchasers, thereby increasing sales and profitability. Consequently, the performance target was 100 per cent of customers with a satisfaction score of 5.

This target was not supported by subsequent data analysis. Figure 4 shows the association between current customer satisfaction scores and the number of positive and negative recommendations in the future (obtained through follow-up surveys). The analysis found that the key distinction linking satisfaction scores and future recommendations was whether customers were very *dissatisfied*, not whether they were very *satisfied*. Customers giving the company satisfaction scores of 1 or 2 were far more likely to give negative recommendations and far less likely to give positive recommendations (if at all). Between satisfaction scores of 3 to 5 there was no statistical difference in either type of recommendation.



**Figure 4** Computer manufacturer study linking customer satisfaction scores to subsequent product recommendations

The appropriate target was not moving 100 per cent of customers into the 5 (very satisfied) category, but removing all customers from the 1 or 2 categories, with the greatest potential gain coming from eliminating very dissatisfied customers (1 on the survey scale).

**Value driver analysis in a financial services firm**

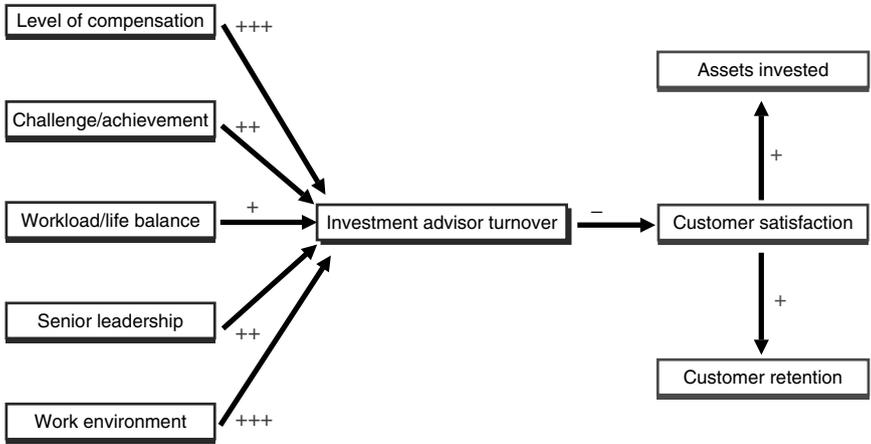
One of the primary criticisms of traditional accounting-based control systems is that they provide little information on the underlying drivers or root causes of performance, making it difficult to identify the specific actions that can be taken to improve strategic results. Yet many non-financial measures used to assess strategic results are also outcome measures that shed little light on lower-level performance drivers. For example, a number of companies in our study found significant relations between customer or employee satisfaction measures and financial performance. But telling employees to ‘go for customer satisfaction’ is almost like saying ‘go for profits’—it has little practical meaning in

terms of the actions that actually drive these results. The question that remains is what actions can be taken to increase satisfaction. Unfortunately, many of these companies did not conduct any quantitative or qualitative analyses to help managers understand the factors that impact customer satisfaction or other higher-level non-financial measures. As a result, managers frequently became frustrated because they had little idea regarding how to improve a key measure in their performance evaluation. More importantly, the selection of action plans to improve higher-level measures continued to be based on management's intuition about the underlying drivers of non-financial performance, with little attempt to validate these perceptions.

Strategic data analysis can help uncover the underlying drivers of strategic success. A major financial services firm we studied sought to understand the key drivers of future financial performance in order to develop their strategy and select action plans and investment projects with the largest expected returns. In this business, increases in customer retention and assets invested (or 'under management') have a direct impact on current and future economic success. What this company lacked was a clear understanding of the drivers of retention and assets invested. Initial analysis found that retention and assets invested were positively associated with the customer's satisfaction with their investment adviser, but not with other satisfaction measures (e.g. overall satisfaction with the firm). Further analysis indicated that satisfaction with the investment adviser was highly related to investment adviser turnover—customers wanted to deal with the same person over time. Given these results, the firm next sought to identify the drivers of investment adviser voluntary turnover. The statistical analysis examining the drivers of adviser turnover is provided in Figure 5. The level of compensation and work environment (e.g. the availability of helpful and knowledgeable colleagues) were the strongest determinants of turnover. These analyses were used to develop action plans to reduce adviser voluntary turnover, and provided the basis for computing the expected net present value from these initiatives and the economic value of experienced investment advisers.

### **Predicting new product success in a consumer products firm**

In the absence of any analysis of the relative importance of different strategic performance measures, companies in our study adopted a



Notation: +/- refers to a strong statistical positive/negative link; more +/- signs reflect stronger statistical associations (precise numbers are not reported at company request)

**Figure 5** Analysis linking employee-related measures to customer purchase behaviour in a financial services firm

variety of approaches for weighting their strategic performance measures when making decisions. A common method was to subjectively weight the various measures based on their assumed strategic importance. However, like all subjective assessments, this method can lead to considerable error. First, it is strongly influenced by the rater’s intuition about what is most important, even though this intuition can be incorrect. Second, it introduces a strong political element into the decision-making process. For example, new product introductions were a key element of a leading consumer products manufacturer’s strategy. To support this strategy, the company gathered a wide variety of measures on product introduction success, including hypothesized leading indicators such as pre-launch consumer surveys, focus group results, and test market outcomes, as well as lagging indicators related to whether the new product actually met its financial targets. However, the company never conducted any rigorous analysis to determine which, if any, of the perceived leading indicators were actually associated with greater probability of new product success.

An internal study by the company found that this process caused a number of serious problems. First, by not linking resource allocations to those pre-launch indicators that were actually predictive of new product success, resources went to the strongest advocates rather than to the

managers with the most promising products. Second, because the leading indicators could be utilized or ignored at the manager's discretion and were not linked to financial results, the managers could accept any project that they liked or reject any project that they did not like by selectively using those measures that justified their decision. These consequences led the company's executives to institute a data-driven decision process that used analysis of the leading indicator measures to identify and allocate resources to a smaller set of projects offering the highest probability of financial success.

## **Barriers to strategic data analysis**

Given the potential benefits from strategic data analysis, why is its use so limited? And, when it is performed, why do many firms find it extremely difficult to identify links between their strategic performance measures and economic results? Our research found that these questions are partially explained by technical and organizational barriers.

### **Technical barriers**

#### **Inadequate measures**

One of the major limitations identified in our study was the difficulty of developing adequate measures for many non-financial performance dimensions. In many cases, the concepts being assessed using non-financial measures, such as management leadership or supplier relations, are more abstract or ambiguous than financial performance, and frequently are more qualitative in nature. In fact, 45 per cent of BSC users surveyed by Towers Perrin (1996) found the need to quantify qualitative results to be a major implementation problem. These problems are compounded by the lack of standardized, validated performance measures for many of these concepts. Instead, many organizations make up these measures as they go along.

The potential pitfalls from measurement limitations are numerous. One of the most significant is reliance on measures that lack statistical reliability. Reliability refers to the degree to which a measure captures random 'measurement error' rather than actual performance changes

(i.e. high reliability occurs when measurement error is low). Many companies attempt to assess critical performance dimensions using simple non-financial measures that are based on surveys with only one or a few questions and a small number of scale points (e.g. 1 = low to 5 = high).<sup>1</sup> Statistical reliability is also likely to be low when measures are based on a small number of responses. For example, a large retail bank measured branch customer satisfaction each quarter using a sample of thirty customers per branch. With a sample size this small, only a few very good or very bad responses can lead to significantly different satisfaction scores from period to period. Not surprisingly, an individual branch could see its customer satisfaction levels randomly move up or down by 20 per cent or more from one quarter to the next.

Similarly, many companies base some of their non-financial measures on subjective or qualitative assessments of performance by one or a few senior managers. However, studies indicate that subjective and objective evaluations of the same performance dimension typically have only a small correlation, with the reliability of the subjective evaluations substantially lower when they are based on a single overall rating rather than on the aggregation of multiple subjective measures (Hemenan 1986; Bommer et al. 1995). Subjective assessments are also subject to favouritism and bias by the evaluator, introducing another potential source of measurement error. The retail bank, for example, evaluated branch managers' 'people-related' performance (i.e. performance management, teamwork, training and development, and employee satisfaction) using a superior's single, subjective assessment of performance on this dimension. At the same time, a separate employee satisfaction survey was conducted in each branch. Subsequent analysis found no significant correlation between the superior's subjective assessment of 'people-related' performance and the employee satisfaction scores for the same branch manager.

A common response to these inadequacies is to avoid measuring non-financial performance dimensions that are more qualitative or difficult to measure. The Conference Board study of strategic performance measurement (Gates 1999), for example, found that the leading roadblock to implementing strategic performance measurement systems is avoiding the measurement of 'hard-to-measure' activities (55 per cent of respondents). Many companies in our study tracked the more qualitative measures, but de-emphasized or ignored them when making

<sup>1</sup> For discussions of issues related to the number of questions, scale points, or reliability in performance measurement, see Peter (1979) and Ryan et al. (1995).

decisions. When we asked managers why they ignored these measures, the typical response was lack of trust in measures that were unproven and subject to considerable favouritism and bias. Although these responses prevent companies from placing undue reliance on unreliable measures or measures that are overly susceptible to manipulation, they also focus managers' attention on the performance dimensions that are being measured or emphasized and away from dimensions that are not, even if this allocation of effort is detrimental to the firm. As a result, the performance measurement system has the potential to cause substantial damage if too much emphasis is placed on performance dimensions that are easy to measure at the expense of harder-to-measure dimensions that are key drivers of strategic success.

### **Information system problems**

The first step in any strategic data analysis process is collecting data on the specific measures articulated in the business model. Most companies already track large numbers of non-financial measures in their day-to-day operations. However, these measures often reside in scattered databases, with no centralized means for determining what data are actually available. As a result, we found that measures that were predictive of strategic success often were not incorporated into BSCs or executive dashboards because the system designers were unaware of their availability.

The lack of centralized databases also made it difficult to gather the various types of strategic performance measures in an integrated format that facilitated data analysis. Gathering sufficient data from multiple, unlinked legacy systems often made ongoing data analysis of the hypothesized strategic relationships extremely difficult and time-consuming.

### **Data inconsistencies**

While the increasing use of relational databases and enterprise resource planning systems can help minimize the information system problems identified in our research, a continuing barrier to strategic data analysis is likely to be data inconsistencies. Even within the same company, we found that employee turnover, quality measures, corporate image, and

other similar strategic measures often were measured differently across business units. For example, some manufacturing plants of a leading consumer durables firm measured total employee turnover while others measured only voluntary turnover, some measured gross scrap costs (i.e. the total product costs incurred to produce the scrapped units) while others measured net scrap costs (i.e. total product costs less the money received from selling the scrapped units to a scrap dealer), and some included liability claims in reported external failure costs while others did not. Inconsistencies such as these not only made it difficult for companies to compare performance across units, but also made it difficult to assess progress when the measures provided inconsistent or conflicting information.

Inconsistencies in the timing of measurement can also occur. A leading department store's initial efforts to link employee and customer measures to store profitability were unsuccessful because different measures were misaligned by a quarter or more. Only after identifying this database problem was the company able to identify significant statistical relations among its measures. Similarly, a shoe retailer found that its weekly data ended on Saturdays for some measures and on Sundays for others. Since weekends are its primary selling days, this small misalignment made it difficult to identify relationships. Correcting measurement and data problems such as these was necessary before the companies could effectively use data analysis to validate their performance measures or modify their hypothesized business models.

A related issue is measures with different units of analysis or levels of aggregation. One service provider we studied had fewer than 1,000 large customers, and sought to determine whether customer-level profitability and contract renewal rates were related to the employee and customer measures it tracked in its executive dashboard. However, when it went to perform the analysis, the company found that the measures could not be matched up at the customer level. Although customer satisfaction survey results and operational statistics could be traced to each customer, employee opinion survey results were aggregated by region, and could not be linked to specific customers. The company also had no ability to link specific employees to a given customer, making it impossible to assess whether employee experience, training, or turnover affected customer results. Furthermore, the company did not track customer profitability, only revenues. To top it off, there was not even a consistent customer identification code to link these separate data files. Given these limitations, it was impossible to conduct a rigorous assessment of the links between these measures.

## **Organizational barriers**

### **Lack of information sharing**

A common organizational problem is 'data fiefdoms'. Relevant performance data can be found in many different functional areas across the organization. Unfortunately, our research found that sharing data across functional areas was an extremely difficult task to implement, even when it was technically feasible. In many organizations, control over data provides power and job security, with 'owners' of the data reluctant to share these data with others. A typical example is an automobile manufacturer that was attempting to estimate the economic relation between internal quality measures, external warranty claims, and self-reported customer satisfaction and loyalty. The marketing group collected extensive data on warranty claims and customer satisfaction while the operations group collected comprehensive data on internal quality measures. Even though it was believed that internal quality measures were leading indicators of warranty claims, customer satisfaction levels, and future sales, the different functional areas would not share data with each other. Ultimately, a senior corporate executive needed to force the two functions to share the data so that each would have a broader view of the company's progress in meeting quality objectives.

Even more frequent was the reluctance of the accountants to share financial data with other functions. Typical objections were that other functions would not understand the data, or that the data were too confidential to allow broader distribution. However, our research found that one of the primary factors underlying these objections was the fear that sharing the data would cause the accounting function to lose its traditional role as the company's performance measurement centre and scorekeeper, thereby reducing its power.

### **Uncoordinated analyses**

The lack of incentives to share data is compounded by the lack of incentives to coordinate data analysis efforts. Most companies perform at least some analyses of performance data, but these analyses are frequently done in a piecemeal fashion. For example, the marketing department may examine the drivers of customer satisfaction, the qual-

ity function may investigate the root causes of defects, and the human resource department may explore the causes of employee turnover, with little effort to integrate these analyses even though the company's strategic business model suggest they are interrelated. The lack of integrated analyses prevents the company from receiving a full picture of the strategic progress, and limits the ability of the analyses to increase organizational learning.

More problematically, the ability of different functions to conduct independent analyses frequently results in managers using their own studies to defend and enhance their personal position or to disparage someone else's. In these cases, the results of conflicting analyses are often challenged on the basis of flawed measurement and analysis. By not integrating the analyses, it is impossible to determine which of the conflicting studies are correct.

### **Fear of results**

As the preceding examples suggest, performance measurement systems and strategic data analysis are not neutral; they have a significant influence on power distributions within the organization through their role in allocating resources, enhancing the legitimacy of activities, and determining career paths. As a result, some managers resist strategic data analysis to avoid being proved wrong in their strategic decisions. We found this to be particularly true of managers who were performing well under the current, underanalysed, strategic performance measurement system. While strategic data analysis could confirm or enhance the value of their strategic decisions, it could also show that their performance results were not as good as they originally appeared.

### **Organizational beliefs**

Finally, more than a few of the organizations we studied had such strong beliefs that the expected relations between their strategic performance measures and strategic success existed that they completely dismissed the need to perform data analysis to confirm these assumptions. We repeatedly heard the comment that 'it must be true' that a key performance indicator such as customer satisfaction leads to higher financial

returns. As our earlier examples indicated, these relationships frequently are not that straightforward. What often drives these strong beliefs is management intuition and past experience. However, even though management intuition and past history play important roles in strategic decision-making, the strategic control literature points out that competitive environments change and must be continually evaluated. Strategic choices and performance measures that were previously determinants of long-term economic success may no longer be valid. Strategic data analysis provides one mechanism to evaluate the ongoing validity of these organizational beliefs.

## Conclusions

Recent discussions of strategic accounting and control systems have emphasized the development of new performance measurement systems that better reflect strategic objectives and their drivers. Our research indicates that the implementation of effective strategic performance measurement systems can be greatly enhanced by adding substantial sophistication to the choice and analysis of strategic performance measures and targets. This requires companies to move away from the overreliance on generic performance measurement frameworks and management intuition that currently guide many strategic performance measurement initiatives, and to place more emphasis on the use of quantitative and qualitative analysis techniques for selecting the measures that are actually leading indicators of strategic performance, determining the relative importance to be placed on the various measures based on their contribution to desired results, and assessing the measures' appropriate performance targets.

Even when data analysis indicates that the selected measures do not exhibit the expected relations, the results provide a mechanism for promoting the dialogue and debate that underlie effective strategic control. The contrary results can be due to incorrect assumptions in the strategic plan and business model, limitations in the measures, database problems, or organizational barriers that prevent improvements from reaching the bottom line. If managers strongly believe that hypothesized relations exist, efforts should be made to determine which of these explanations is true.

Finally, we found that successful data analysis and interpretation efforts require clear assignment of responsibilities for conducting ana-

lyses, strong executive support to ensure the availability of adequate resources and cross-functional cooperation, and regularly scheduled, ongoing reassessment of the results. The need for ongoing analysis is particularly important. Dynamic changes in a company's life cycle, corporate strategy, and competitive environment can change the relations in the strategic business model over time, or even make the entire business model obsolete. Regular, ongoing analyses allow the company to verify that the strategy, business model, and hypothesized linkages remain valid.

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