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Strategic Management Accounting: Implementation and Control

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***Abstract*—**This paper discusses the design characteristics management accounting systems should have to be useful for strategic planning and control and provides brief introductions to strategic variance analysis, profit-linked performance measurement models and balanced scorecard. It shows two multi-period, multi-product models are specified, can be related to Porter's strategy framework and cost and revenue drivers, and can be used to support strategic planning, control and cost management.

***Keywords*—**Accounting, Balanced scorecard, Profit-linked, Strategic management, Variance analysis

I. Introduction

WARD [1] refers to strategic management accounting as "accounting for strategic management" where strategic management is an integrated management approach that draws together all the individual elements involved in planning, implementing and controlling business strategy. Thus, strategic management accounting serves strategic decision makers by providing information on the financial implications of alternative business strategies. The concept was defined more narrowly by Bromwich [2] as "the provision and analysis of financial information on the firm's product markets and competitors' costs and cost structures and the monitoring of the enterprise's strategies and those of its competitors in these markets over a number of periods". As business environments have become increasingly dynamic and competitive, it has become increasingly important for managers to develop coherent, internally and logically consistent business strategies and to have tools and models which provide useful information to support strategic decision-making, planning, implementation and control. In response to these needs, there have been many important developments, in both management accounting research and practice, that focus on the use of accounting data and related information regarding strategy and operations for these purposes. Some of the most important developments in strategic planning and control have been: The balanced scorecard, a comprehensive set of performance measures designed to assist managers in implementing competitive strategies and monitoring performance with respect to them [3], Strategic variance / profitability analysis, systems which decompose measures of budgeted versus actual net income into variances which managers can relate logically to a firm's or strategic business unit's (SBU's) mission and business strategy and therefore use to analyze performance from a strategic perspective [4], [5], Profit-linked performance measurement systems, models which decompose measures of changes in profitability over time into measures of changes in constructs such as productivity and price recovery, which can be logically linked to a firm's/SBU's mission and business strategy and analyzed from those perspectives [6]-[9] and Levers of control, a comprehensive framework for organizing and employing management control systems to promote strategic objectives (see [5]).

This paper: (II) discusses characteristics management accounting information systems should have to be useful for strategic planning and control, in the context of Porter's [10]-[13] strategy framework, (III) briefly introduces strategic variance analysis, (IV) provides a more substantial introduction to profit-linked performance measurement systems and (V) balanced scorecard is discussed.

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II. The Design of Strategic Cost Management and Control Systems

If management accounting information systems are to be useful for strategic purposes, that is, to help managers increase the likelihood that they can achieve their strategic goals and objectives, their designs and use must follow from firms' missions and competitive strategies. In Porter's framework, strategy should follow from an analysis of the determinants of the nature and intensity of competition: the firm's/SBU's bargaining over its consumers and suppliers, threats from new entrants and substitute products (barriers to entry and exit), and the intensity of rivalry in product markets. To generate a sustainable competitive advantage, a strategy must: (i) establish a unique market position based on low cost leadership, product differentiation, or a workable combination of the two, with an appropriate scope of markets (broad or focused/niche); (ii) be differentiated from competitors' strategies, through unique product variety, ability to satisfy customer needs, and/or access to particular customer segments; and (iii) employ chains of complementary, value-adding activities which are difficult for competitors to replicate. The chosen strategy, in turn: (i) determines the SBU's critical success factors, such as delivering superior product and service quality and achieving high price recovery for SBUs pursuing differentiation strategies, or achieving economies of scale, improving productivity and delivering threshold product and service quality at low prices for SBUs pursuing low cost leadership strategies, and (ii) informs choices regarding the design of products and configuration of operations which drive costs and revenues. For a set of performance measures to exhibit content validity in a strategic context, then, it must measure constructs related to the mission and strategic framework, the selected strategies, the firm's/SBUs' critical success factors, and operating choice variables.

In addition, the constructs, and their measures, must be causally linked. Performance measurement systems should explicitly incorporate models of profit-generating processes,

so, when managers take actions the models suggest will improve performance along one or more dimensions, the intended improvements are likely to materialize. Thus, the models should incorporate relationships over time as well as contemporaneous relationships and linkages capturing cause-and-effect relationships between constructs and measures of performance throughout the firm (horizontally and vertically; aggregated to disaggregated; across the entire value chain). Finally, the measures should also have 'good' theoretical and empirical measurement properties (see, for example, Johnston and Banker : [14], [15]).

III. Strategic variance analysis

Strategy management accounting emphasizes information which relates to factors external to the company. It examines the decision-making linked with the business operations and strategic issues of financial administration. Where there are deviations in operation, strategic variance analysis is conducted. This refers to decomposing measures of budgeted versus actual net profit into variances. Managers can relate the profit variances to their companies' or SBU's mission and business strategy, and then analyze performance from a strategic perspective. To implement this, profit variances are sub-divided into different types of second level variances which capture the separate impacts of key underlying factors. For example, there are deviations between actual and budgeted sales volumes and mixes, market sizes and shares, manufacturing costs, and contribution margins. For profitability, a build, hold or harvest perspective in terms of low cost leadership or product differentiation is built. By analyzing the variances with explicit reference to a company's / SBU's mission and business strategy, management accountants can determine the extent to which deviations between actual and budgeted performance are or are not consistent with the business mission and strategy. Analyzing the variances without reference to mission and strategy is misleading or uninformative. Profit variances are classified into effectiveness variances (market size, market share, selling prices, and product volume and mix variances) and efficiency variances (materials and labour price and efficiency variances, activity-based cost variances, and committed cost spending variances). Effectiveness variances are essential to SBUs pursuing differentiation strategies. They focus on sales and product mix aspects. Efficiency variances are important to units pursuing low cost, high volume strategies. They focus on cost and efficiency aspects.

IV. Profit-linked performance measurement systems

Kaplan and Norton [16] sub-divide measures of changes in profitability over time into measures of changes in certain elements, such as productivity and price. These are systematically linked to a company's / SBU's mission and business strategy and are evaluated based on these aspects. Profit-linked systems incorporate measures of productivity, price recovery, capacity utilization, and other relevant dimensions of performance. Practitioners initiate the development efforts, with systems which decompose measures of profitability into measures of price recovery and productivity. Academics refine and extend the systems from management accounting, business strategy and production economics perspectives. This illustrates how the systems can be used to analyze cross-sectional differences and time-series changes in performance regarding changing competitive environments and strategies.

A. Model Specification

Banker and Johnston [9] and Banker, Chang and Majumdar [7] define a measure of relative profitability as the ratio of two total factor productivity indices, one for the period of interest t and one for the benchmark or base period 0:

$$PFTBLT_t = \frac{\Sigma_m p^t_m y^t_m / (\Sigma_v w^t_v x^t_v + \Sigma_f w^t_f x^t_f)}{\Sigma_m p^0_m y^0_m / (\Sigma_v w^0_v x^0_v + \Sigma_f w^0_f x^0_f)}$$

where:

y^t_m = actual quantity of output m sold during period t, m=1,2,...,M, t=0,1,2,...,T

p^t_m = selling price per unit of output m

x^t_v = actual quantity of variable cost input v employed, v=1,2,...,V

w^t_v = price per unit of variable cost input v

x^t_f = actual quantity of fixed cost input f employed, f=1,2,...,F

w^t_f = price per unit of fixed cost input .

For empirical analyses, the benchmark prices and quantities may be defined according to an organization's performance during a suitable time period, the organization's average performance over several periods, or the performance of a set of close competitors, depending on the objective of the application and implications for interpretation. (For the analyses discussed below the benchmarks as averages across ten U.S. airlines and twenty quarters from 1981Q1 (first quarter) to 1985Q4) were defined [15].The models are based on assumptions consistent with standard cost accounting that, in the short to medium run, the production technology can be characterized as a fixed proportions technology with input functions that can be approximated linearly within relevant ranges by standard quantities. Standard quantities for each input, based on quantities required to produce one unit of actual output (or output capacity), are denoted by:

z^t_v =standard quantity of variable cost input v, for all actual outputs y^t_m, m=1,2,...,M

z^t_f =standard quantity of fixed cost input f, given all output capacities k^t_m, m=1,...,M, for dedicated processes [9] or a common capacity k^t [7]

q^t_f =standard quantity of fixed cost input f, given standard capacity utilization rate(s) and all actual outputs y^t_m.

For empirical analyses, the standards may be specified, as in standard costing systems, to reflect engineering or managerially determined benchmarks, or defined with respect to an estimated production frontier (see, for example, Grifell-Tatjé and Lovell : [17]).

$PFTBLT_t$ factors into four measures: (i) a productivity change ratio ($PRDTVT_t$), due to changes in the use of variable and fixed cost inputs relative to standards, given actual outputs and capacities, (ii) a capacity utilization change ratio ($CAPUTL_t$), due to changes in deviations between actual outputs and capacities, (iii) an output mix change ratio ($OUTMIX_t$), due to changes in the volumes and mix of actual outputs, and (iv) a price recovery change ratio ($PRCREC_t$), due to changes in output and input prices. The measures are defined as:

$$PRDTVT_t = \frac{(\Sigma_v w^t_v z^t_v + \Sigma_f w^t_f z^t_f) / (\Sigma_v w^t_v x^t_v + \Sigma_f w^t_f x^t_f)}{(\Sigma_v w^0_v z^0_v + \Sigma_f w^0_f z^0_f) / (\Sigma_v w^0_v x^0_v + \Sigma_f w^0_f x^0_f)}$$

$$CAPUTL_t = \frac{(\Sigma_v w^0_v z^t_v + \Sigma_f w^0_f q^t_f) / (\Sigma_v w^0_v z^t_v + \Sigma_f w^0_f z^t_f)}{(\Sigma_v w^0_v z^0_v + \Sigma_f w^0_f q^0_f) / (\Sigma_v w^0_v z^0_v + \Sigma_f w^0_f z^0_f)}$$

$$OUTMIX_t = \frac{\Sigma_m p^0_m y^t_m / \Sigma_m p^0_m y^0_m}{(\Sigma_v w^0_v z^t_v + \Sigma_f w^0_f q^t_f) / (\Sigma_v w^0_v z^0_v + \Sigma_f w^0_f q^0_f)}$$

$$PRCREC_t = \frac{\Sigma_m p^t_m y^t_m / \Sigma_m p^0_m y^t_m}{(\Sigma_v w^t_v z^t_v + \Sigma_f w^t_f z^t_f) / (\Sigma_v w^0_v z^t_v + \Sigma_f w^0_f z^t_f)}$$

The ratios are constructed so their values are driven solely by deviations between relevant variables within and between time periods by either exogenous variables that managers must take into account in making decisions or endogenous variables that managers choose. As a result, their values move in directions that reflect actions managers must take to improve performance.

B.Theoretical and Empirical Relatinships between the Measures, Porter's Framework, and Operating Choice Variables

In Porter's framework, to achieve a competitive advantage, a firm/SBU must devise a strategy to defend against, or take advantage of, the structural determinants of the nature and intensity of competition. The levels and time-paths of the ratios reflect outcomes of managers' efforts to exploit sources of bargaining power over consumers and suppliers and to reduce threats from new entrants and substitutes, as well as the intensity of competition. Emphases on improvements in productivity and capacity utilization, shifts in product mix toward products with lower unit costs, and low price recovery are consistent with low cost strategies. Less emphasis on productivity and capacity utilization, changes in product mix which may be more costly but serve less price sensitive consumers, and higher price recovery are consistent with differentiation. These relationships are fairly general and should hold for any industry or SBU.Operating choice variables (structural and executional cost and revenue drivers; see, for example, Shank and Govindarajan: [4]), and their relationships to the ratios, are conceptually similar across industries but often industry-specific in terms of measurement. Within industries, the design of each SBU's products differs, depending upon the SBU's particular customer and market orientation and the configuration and characteristics of each SBU's operations should differ accordingly. To develop a schema of relationships for airlines, Johnston and Banker [15] searched three business databases for statements by airline industry and firm representatives and analysts related to the dimensions of competition posited by Porter [10], [11], the constructs captured by the ratios, and industry-specific operating choice variables, such as hub concentration and service quality. They found substantial differences in the extent to which carriers sought to exert power over consumers, by establishing local monopoly power or providing superior service, and to exert power over labor. Some carriers had route structures that were vulnerable to new entrants and substitute forms of transportation; others established 'no-frills' service and low cost subsidiaries and competed aggressively on fares. They used the schema to rank carriers along a continuum between low cost leadership and extreme differentiation. This ranking and two others based on analyses of the ratios alone were very highly correlated.

To show how a formal model of the associations between the ratios and operating choice variables could be developed and estimated, we regressed the ratios on measures of three operating characteristics (hub concentration, stage length, service quality) and variables to capture the impact of events such as strikes. The coefficient estimates provided estimates of the simultaneous impacts of small changes in the operating choice variables and events on the ratios. For example, carriers with competitive hubs had significant gains in PRDTVT and CAPUTL which were almost completely offset by losses in PRCREC and OUTMIX, so the net impact on PFTBLT was insignificant. Carriers that dominated their hubs had higher gains in CAPUTL, lower losses in PRCREC and OUTMIX, and a significant positive net impact on PFTBLT.

C. Cross-sectional Differences and Time-series Changes in Relation to Porter's (1980, 1985) Strategies, Operating Choice Variables and Events

In response to deregulation, competition increased, and all of the carriers had increasing PRDTVT ratios and decreasing PRCREC. However, carrier's primarily realizing differentiation strategies had relatively high PRCREC and low PRDTVT. Carrier's primarily realizing low cost strategies had high PRDTVT and low PRCREC. To investigate the measures' ability to track adjustments and changes in strategies on a period-by-period basis, we conducted an analysis in which we sought to relate dated information in the statements to cross-sectional differences in the levels of the ratios and trends, step increases and decreases, and short-term, temporary increases and decreases in the ratios. The following discussion for Continental, condensed from Johnston and Banker [15], shows how the ratios can capture the effects of incremental and dramatic changes in strategy.

Continental entered deregulation as a relatively high-cost, moderate-quality carrier, reducing costs but without much emphasis on exploiting bargaining power over labor, realigning its network into a hub-and-spoke system, or maintaining fare levels. As a result, its PRCREC was slightly above the sample average, PRDTVT was below average and increasing, and CAPUTL was low. When Frank Lorenzo took over Continental in October 1981, he immediately began to pursue a low cost leadership strategy, in manners reflected in increasing PRDTVT, OUTMIX and CAPUTL and declining PRCREC. The strategy included hub efficiencies, high productivity, low fares, and aggressive efforts to exploit bargaining power over suppliers. During this period, PRDTVT increased, but labor-management problems led to strikes by mechanics in August 1983 and pilots and flight attendants in October 1983. In September 1983, Lorenzo filed for bankruptcy protection, eliminated nearly two-thirds of Continental's employees, reduces wages and salaries by nearly 50%, cut benefits, and imposed work rules to increase productivity. PRDTVT did not decrease much during the mechanics' strike because Lorenzo hired replacement labor and continued operations at 85% to 93% of normal levels. The pilot and flight attendant strikes and bankruptcy proceedings are reflected in a sharp decrease in PRDTVT, as Continental maintained less than 80% of normal services. In January 1984 Continental emerged from bankruptcy as a low cost carrier, with above-average, increasing PRDTVT and CAPUTL and below-average, decreasing PRCREC. Although there were claims that Continental was improving service quality during this period, Continental had the poorest record of complaints in our sample. Finally, Continental expanded and threatened competitors aggressively. Lorenzo repeatedly initiated changes which increased the intensity of competition.

D. Applications for Strategic Planning and Control

The values of profit-linked performance measures are driven by variables that managers must take as given when making decisions or variables that reflect actions managers must take to improve performance and they can be systematically linked to constructs and measures involved in business strategies, critical success factors, and product and process design. As a result, the models can be useful for formulating strategies, evaluating realized strategies relative to planned strategies, and evaluating the impacts of related managerial decisions. Managers can use the models to examine the impacts of strategic choices and events on each component dimension of performance, understand the trade-offs involved more clearly, and therefore devise more coherent, internally consistent combinations of strategies and tactics.

Once managers have specified and estimated a model for their specific context, they can use it to facilitate strategy formulation and implementation, and to support an on-going, evolutionary process of motivating and monitoring progress toward strategic goals and objectives and adapting choices in response to feedback obtained (continuous improvement). Prior to choosing new strategies, managers can analyze the time-paths of the component measures and operating choice variables, computed with

Historical data, in conjunction with information regarding past intended strategies, events, distinctive competencies, and weaknesses, to evaluate the effectiveness of past strategies. They can determine the extent to which they have been achieving a low cost or differentiation strategy (whether explicitly formulated and intended or not), or a combination of the two, and dimensions along which performance has and has not been consistent with those strategies. The model can also be used for simulation and sensitivity analysis, to identify feasible alternative strategies and project the time-paths of the ratios and operating variables required to implement each successfully. During implementation, managers can monitor the values of the ratios and operating choice variables over time, relative to projected targets or benchmarks, to determine the extent to which they are achieving their objectives. The measures can be employed in responsibility accounting systems, to orient performance measurement and evaluation around achieving critical success factors and strategic objectives and to motivate and reinforce behavior on the part of managers which is congruent with strategic goals.Since the ratios' values are mathematically related and anchored around one (1), the measures can be used to compare the performance of SBUs particularly to evaluate SBUs that perform similar functions or pursue common strategies (for example, a subset of SBUs engaged in manufacturing and pursuing low cost strategies or a subset pursuing differentiation strategies in related niche markets). Cross-sectional, time-series analyses (between firms within given industries) of U.S. airlines and telecommunications firms and Spanish banks, in the context of deregulation, have yielded intuitively appealing and logically consistent substantive results [7], [15], [17]. Similar analyses could be conducted for SBUs within a given firm. If the SBUs share a common production technology, the input standards could be defined according to best practice.Responsibility for aggregate measures can be assigned to SBU managers with responsibility for implementing and revising strategy, for monitoring and explaining actual results relative to the intended strategy. Responsibility for component measures can be assigned to individuals and teams who are responsible for improving the relevant dimensions of performance and making and explaining changes in particular product and process design variables. For example, PRDTVT is a weighted average of measures of changes in partial productivity (productivity by input as opposed to total factor productivity). Therefore, responsibility for individual partial productivity measures can be assigned to the relevant supervisors or plant teams. PRCREC can be expressed as a weighted average of changes in price recovery by product, so responsibility for changes by product can be assigned to product line managers and evaluated with respect to the strategy selected for each product (low cost leadership or differentiation).

E. Extensions for Strategic Cost Management

The design and use of strategic cost management systems are oriented around the application of three basic tools: cost and revenue driver analysis, value chain analysis, and strategic positioning analysis (see, for example, Shank and Govindarajan: [4]). Important developments during the past two decades include activity-based costing and management, target costing, life-cycle costing, customer profitability and value analysis, and models for measuring and managing quality, environmental and capacity costs. These systems are designed to provide managers with relevant, accurate and timely information, by highlighting previously hidden costs, related nonfinancial data and inherent trade-offs between cost categories, so managers can identify opportunities for improvement, weigh trade-offs, set priorities, and take actions to reduce costs and increase revenues which are consistent with intended strategies. Profit-linked models can be refined in many ways to make them more useful for strategic cost management. For example, the measures can be decomposed further. PRDTVT and CAPUTL can be decomposed into measures of pure technical change (innovation entailing changes in structural cost drivers, and revenue drivers when they involve simultaneous improvements in product quality) and changes in technical and allocative efficiency (executional cost drivers), using methods along the lines employed by Grifell-Tatjé and Lovell [17]. OUTMIX captures the impacts of changes in economies of scale (an important structural driver). By adding a term for the minimum efficient scale size, for technologies with increasing returns-to-scale, or for the optimal scale, for technologies with increasing, constant and decreasing returns, the effects of scale efficiency from the effects of changes in product mix should be able to disentangle. By introducing variables for market size and share, along lines employed by Shank and Govindarajan [4], their effects from those of changes in product mix should be able to disentangle.Also, costs are currently separated into variable and fixed costs, and aggregated by function in the illustrative analyses in Banker and Johnston [9], [15] and Banker, Chang and Majumdar [7]. But they can be organized and indexed by stages of the value chain and be more finely grained. For functions or stages of the value chain where activity-based costing and management would be useful, costs can be categorized according to the relevant cost hierarchies (unit-, batch-, product-sustaining-, customer-sustaining-, channel-sustaining-, and facilities-/organization-sustaining-level costs), and denominator volumes computed at practical capacity [18], so PRDTVT and other ratios can be disaggregated accordingly. For functions or stages of the value chain where capacity cost measurement and management is useful, the relevant output capacities ktm and inputs can be indexed according to a framework such as the Consortium for Advanced Manufacturing - International model [19], so the relevant portions of CAPUTL can be decomposed accordingly.

V. Balanced scorecard

There has been a proliferation of non-financial as well as financial performance measures. Examples are quality measures, delivery service measures and customer satisfaction measures. In addition, it is also often not clear to managers how the non-financial measures contribute to the whole picture of achieving organization success. Kaplan and Norton [16] suggested devising a balanced scorecard for an individual organisation to identify the key performance measures and to link financial and non-financial measures of performance. The balanced scorecard is a set of measures that gives senior management a comprehensive but fast view of the operation. Kaplan and Norton used "Translating Vision and Strategy: Four Perspectives" to illustrate how the balanced scorecard links performance measures. They establish a vision and strategy framework to incorporate four business perspectives of the company.

- *Learning and growth perspective* – includes human resources measures such as employee satisfaction, employee retention, skill sets, etc.
- *Business process perspective* – includes financial measures such as cost, throughput, and quality. They are for business processes like materials purchase, production, and order completion.
- *Customer perspective* – includes measures such as customer retention, customer satisfaction and market share in target segments.
- *Financial perspective* – includes financial measures such as operating profit, return on capital employed, and economic value added.

These four perspectives are not collections of independent perspectives. There is a logical connection between them – learning and growth contribute to better business processes, which in turn lead to increased value to the customers, which finally contributes to improved financial performance.

VI. Conclusion

Strategic management accounting practices exist in different forms within companies seeking to use both financial and non-financial information as well as external market-based information. It is also subject to wider contextual influences including industry-specific effects.Strategic management accounting systems include a wide array of techniques. The balanced scorecard, profit-linked performance measurement systems and strategic variance analysis are common and well-utilized. Their implementation and effects on companies are best considered in visionary and creative terms. Apart from cost and benefit analysis, understanding organizational context from a long-term spectrum is the key to the implementation of an effective strategic management accounting system.

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