



# Interfunctional cooperation in progressing accounting for brands

## The case for brand management accounting

Interfunctional  
cooperation

229

Robin Roslender

*School of Management and Languages, Heriot-Watt University,  
Edinburgh, UK, and*

Susan J. Hart

*Department of Marketing, University of Strathclyde, Glasgow, UK*

### Abstract

**Purpose** – The purpose of this paper is to identify brand management accounting as a further approach to accounting for brands and to suggest a number of possible measurement metrics it might incorporate.

**Design/methodology/approach** – The paper is discursive in nature, developing a critique of existing approaches to accounting for brands before considering a number of attributes of a new approach.

**Findings** – The growing importance of brands as a key source of competitive advantage has been among the most visible changes in many business organisations in recent years. Effective strategic brand management, therefore, poses a major challenge to both accountants and their marketing colleagues. To date, the history of accounting for brands has largely been concerned with the derivation of brand valuations suitable for financial accounting and reporting purposes. Although the merits of a management accounting perspective on brands have been recognised for some time, recent studies indicate that to date it has failed to attract much support. New approaches to accounting for brands are now required. Underpinned by high levels of interfunctional cooperation between management accounting and marketing management practitioners, brand management accounting exemplifies the more inclusive approach to the task of strategic management increasingly evident within contemporary organisations.

**Originality/value** – The paper integrates both existing and new insights informed by the accounting and marketing literatures in an attempt to promote a further approach to the task of accounting for brands.

**Keywords** Brands, Brand management, Accounting, Marketing management

**Paper type** Research paper

### 1. Introduction

Among the many changes that have been evident in business organisations during the past quarter of a century, few have been more significant than the emergence of successful brands as potential sources of long term competitive advantage. While branding has been practised for centuries (Morgan, 1986; Low and Fullerton, 1994), with craftsmen marking their products in some way in order to enable customers to

The authors wish to thank the reviewers for their many helpful and insightful comments on previous drafts of this paper, the journal's editor and the Research Foundation of the Chartered Institute of Management Accountants for the financial support of the study that provided the principal motivation for this paper.



Journal of Accounting &  
Organizational Change  
Vol. 2 No. 3, 2006  
pp. 229-247

© Emerald Group Publishing Limited  
1832-5912  
DOI 10.1108/18325910610690072

distinguish them from those of their competitors, during the past 25 years brands have become an increasingly visible feature of everyday life, a “must-have” for consumers and producers alike. Consequently, brands have posed a challenge to the accountancy profession which has sought to take them into account in some way. In parallel, the marketing profession has invested considerable resources in the pursuit of effective strategic brand management. Both of these activities have occurred in the context of a rapidly changing organisational environment, one in which the exclusive jurisdictions traditionally associated with the different professional functions have been replaced by greater levels of interfunctional cooperation in the pursuit of delivering value to the customer.

To a very great extent, however, the task of accounting for brands has failed to keep pace with the growing importance of brands themselves and, unfortunately, is presently becalmed. Considerable attention has been focused on incorporating brand valuations in the balance sheet. This has not proved very successful, largely because of the limitations that the accountancy profession itself has placed on such activities; these are likely to remain place in the near future. The foundations of a management accounting for brands approach have previously been identified, although these have not been subject to much development since the early 1990s. Recent research has confirmed that marketing management practitioners remain more enthusiastic about such an approach than their accounting colleagues (Guilding and Pike, 1994a; Cravens and Guilding, 2001a; Roslender and Hart, 2002, 2003). To us, this suggests that an opportunity exists to develop a greater level of cooperation between accounting and marketing practitioners in the task of accounting for brands as a key contribution to effective strategic brand management.

The principal purpose of this paper is to identify brand management accounting as a much-needed new approach to accounting for brands. Building on a range of existing insights, brand management accounting is commended as a fully interfunctional approach to this challenge. The structure of the paper is as follows: in the next section the financial accounting and reporting emphases of much accounting for brands are briefly examined. This remains how most observers understand the task of accounting for brands. In section three, work by Guilding and his colleagues in the early 1990s on the formulation of a management accounting perspective on brands is discussed, together with later empirical studies reporting the modest uptake of brand value accounting. Section 4 identifies the key underpinnings of a brand management accounting approach to the task of accounting for brands, a mature interfunctional development integrating insights from the contemporary marketing management and management accounting literatures. In the fifth section of the paper, possible marketing, accounting and interfunctional information sets on brands are identified and discussed. In the concluding section, we consider the prospects for greater levels of interfunctional cooperation between marketing managers and management accountants, the key to the new approach.

## 2. Accounting for brands

To many readers, accounting for brands refers to the task of incorporating brands in the balance sheet. This has proved a problematic exercise due to the difficulties in identifying the values at which brands might be included among an enterprise’s assets. In the late 1980s, brand valuation became a very hotly debated issue in the UK with

a number of high profile companies including brand valuations in their balance sheets, a practice proscribed under the prevailing financial reporting framework. Grand Metropolitan reported valuations for a number of recently acquired brands. Ranks Hovis McDougall went one step further, reporting valuations for “home grown” brands. Supported by their auditors, companies made extensive use of consultants, Interbrand being the best known in the UK (Murphy, 1989; Penrose and Moorhouse, 1992; Power, 1992; Guilding and Moorhouse, 1992; for alternative approaches see Haigh, 1997; Kapferer, 1998; Keller, 1998). Barwise *et al.* (1989) identified the suspect reliability associated with such valuations as presenting a major problem for those tempted to follow suit (Barwise *et al.*, 1989). In 1990, the UK Accounting Standards Board (ASB)’s Exposure Draft 52 confirmed that the recently developed brand valuation approaches remained unlikely to provide the necessary degree of reliability to permit companies to report brand valuations alongside those for other assets.

Although the issue soon disappeared from the public arena, the debate and brand value reporting activity quietly continued. In due course, Financial Reporting Statement (FRS) 10: *Goodwill and Intangible Assets*, issued in 1997 (ASB, 1997), permitted companies to include brands acquired in the course of a business combination among its stock of fixed assets at cost (Ong, 2001). Cost is identified as the fair market value of the separable (= individual) brand. Any premium over the latter value is to be accounted for as an element of goodwill, with both amounts normally to be amortised over a period not exceeding twenty years. The following year FRS 11: *Impairment of Fixed Assets and Goodwill* (ASB, 1998) provided guidance in cases where brands (or similar intangible assets) do not lose value during an accounting period, as well as what should happen if they suddenly do so.

The concurrent International Accounting Standard (IAS) 38: *Intangible Assets* permitted the same treatment as FRS 10, except that in the very rare case where such assets are deemed to have an indefinite useful life, amortisation is to be over a twenty year period. In such cases, FRS 10 allows for impairment tests rather than amortisation. In a significant change in policy, International Financial Reporting Standard (IFRS) 3: *Business Combinations*, issued in 2004 (IASB, 2004), requires that purchased goodwill be included in the accounts of the acquiring business at cost but not subjected to amortisation, with impairment tests conducted at least annually. In parallel, the revised IAS 38 requires that where an intangible asset with a finite life is acquired, its value is to be amortised in an appropriate way (IASB, 1998). Where an asset’s life is regarded as being infinite, impairment testing rather than amortisation is necessary.

The critical case of “home grown” brands remains unchanged. In the normal course of events, incorporating valuations for such brands remains proscribed on the grounds of a lack of reliability. This also applies where any appreciation in the value of a purchased brand occurs, i.e. where the market recognises that current market value exceeds an earlier market value. The reasoning underlying this position is that within the prevailing financial accounting and reporting paradigm a brand is only recognised to have a value when this is realised in the act of purchase by the acquiring company. The act of purchase, and the notion of value realisation underpinning it, is, therefore, accorded a significance that is increasingly difficult to justify in an era when both seller and buyer are likely to use similar methodologies to determine their respective valuations of such assets.

In recent years, brands and kindred intangible assets such as company reputation and customer loyalty have been identified as part of the relational (or customer) capital element of intellectual capital, now recognised to provide the basis for long-term value creation for a growing number of businesses (Edvinsson, 1997; Lynn, 1998; Mouritsen, 1998). Intellectual capital constitutes the “hidden value” of such businesses, often being reflected in escalating market-to-book value ratios. Attempts to “account” for stocks of intellectual capital in the usual way, i.e. by means of incremental asset valuations, have indicated that even if this was possible (the reliability issue), it is not necessarily the most beneficial way to proceed. Consequently, serious doubts have emerged about whether valuation is necessarily the best means of representing the commercial importance of many such key business assets. Alternative means of representing and communicating the growth in the value creation capacity of a business’s brands, especially those in the “home grown” category, outwith the traditional financial statements, promises to be of considerable utility to the management of any business, as well as to a number of external stakeholders.

### 3. Management accounting for brands

Although interest in accounting for brands has principally been an issue within financial accounting and reporting, it has also attracted attention from some management accounting researchers, most notably Guilding who together with several colleagues has contributed a succession of valuable insights. Guilding (1992) asserts that a specifically management accounting approach to brand valuation promises a number of benefits:

[It] can foster a closer relationship between the marketing and accounting functions, provide relevant information to support brand related decision-making and introduce a counter to short-termism promoted by conventional accounting measures of performance (Guilding, 1992, p. 44).

The Interbrand approach to brand valuation identified in the previous section incorporates insights from both functions: the accounting function is primarily responsible for generating information on brand earnings, while the marketing function focuses on the determination of brand strength and the derivative multiplier to be applied to the latter earnings. Management accounting’s more relaxed attitude towards objectivity results in it being less uncomfortable with the subjectivity inherent in brand strength exercises. For Guilding management accounting “is better positioned than financial accounting to provide the lead in developing, applying and disseminating brand valuation techniques.” (Guilding, 1992, p. 55; Guilding and Pike, 1990, p. 48).

Guilding and Moorhouse (1992) identify brand value budgeting as a key management accounting development (Egan and Guilding, 1994). It entails incorporating brands in the budget, something Guilding and Moorhouse explore by considering the five functions budgets perform and their implications for promoting dialogue about brands within the organisation. Guilding *et al.* (2000, p. 131) describe brand value budgeting as:

[T]he use of brand value as a basis for managerial decisions on the allocation of resources to support/enhance a brand position, thus placing attention on management dialogue on brand issues.

This is distinguished from brand value monitoring, described as “[T]he financial valuation of a brand through the assessment of brand strength factors... combined

with historical brand profits.” (Guilding *et al.*, 2000, p. 131)). Both are identified as brand valuation practices (Guilding *et al.*, 2000, p. 118).

Guilding and Pike (1994a, b) provide further insights on the promise of a management accounting perspective on brands, now referred to as *brand value accounting*. The former paper reports the findings of a questionnaire administered to 140 UK managers. There was greater support for propositions associated with longer-term, strategic management issues rather than short term operational issues. This accorded with their initial exploratory interviews and the views of managers in a case company studied following the survey. Marketing managers were found to be more positively disposed to such developments than their counterparts in accounting and finance. Guilding and Pike suggest that this may reflect their relative levels of comfort with the more technical implications of such developments. Interviews reported in Guilding and Pike (1994b) indicate that although most of the companies in a field study had initially become interested in brand valuation for financial accounting and reporting reasons, internally oriented needs now assumed a growing importance. Brand value accounting is recognised to promote a desirable counter to short termism while increasing the extent of (desirable) communication at the management accounting and marketing management interface. Brand value accounting also facilitates strategic decision making.

After a break of several years, Guilding returned to the study of brand value accounting. In addition to including such approaches as examples of strategic management accounting practices in Guilding *et al.* (2000) and Cravens and Guilding (2001b), he published a number of papers with Cravens specifically on brand value accounting/brand valuation. Cravens and Guilding (1999a) reports on the uptake of brand value accounting in the USA. As capitalising the value of brands was proscribed in the USA, they expected to encounter limited interest in developing such approaches. A high degree of interest in the practice of brand value accounting was evident, however, with marketing managers again exhibiting greater enthusiasm. Because such information was used principally for managerial purposes, including deliberations on mergers and acquisitions, the lack of opportunity to capitalise brand value was not viewed as a significant deterrent to such activities. Cravens and Guilding also report that interest in brand value accounting was greater in companies exhibiting a short term orientation as well as in companies with a low market orientation.

Cravens and Guilding (2000) uses the same data set to consider the relationship between brand valuation and the adoption of a market orientation strategy (Narver and Slater, 1990; Kohli and Jaworski, 1990). Companies in the sample with strong brands and which were pursuing a market orientation strategy were more likely to use brand valuation. In addition, such companies were also found to return greater levels of organisational performance and to exhibit less of a short-term orientation. These findings support Slater *et al.*'s (1997) recommendation that companies with strong brands should employ brand valuation as part of a market orientation strategy while also confirming that brand valuations may be an effective means of assessing customer value.

Finally, Cravens and Guilding (2001a) examines 12 propositions on the beneficial managerial implications deriving from brand value accounting, similar to those identified (and explored) in Guilding and Pike (1994a), in the context of samples of strongly branded companies in the UK, the US and New Zealand. UK respondents were

found to be the least disposed to brand value accounting compared to their counterparts in either the US or New Zealand samples. As in the earlier study reported in Guilding and Pike (1994a), overall, marketing managers perceived greater managerial implications arising from brand value accounting.

The latter papers confirm that whatever merits Guilding and his colleagues may believe a management accounting for brands perspective exhibits, it has attracted relatively little support since it was initially commended in the early 1990s. Sceptical observers might conclude that despite the growing importance of brands to many businesses, there is little benefit in continuing to devote resources to developing a management accounting perspective on brands. While acknowledging this position, it is nevertheless important to recognise that during the past decade, there is little evidence to suggest that, in order to address this situation, the advocates of a management accounting for brands perspective have been active in exploring what else such a perspective might entail. This contention is supported in a further paper by Cravens and Guilding (1999b) in which they identify and discuss the four main approaches to the task of brand valuation: cost-based; market-based; income-based; and (the preferred) formulary approaches. The greater part of the paper rehearses ideas that were current in the early 1990s, since which time management accounting has unquestionably made significant advances.

This apparent lack of interest in considering how it might be possible to formulate a further approach to accounting for brands, one that continues to incorporate a range of insights from both marketing management and management accounting, is a cause for some concern. This is particularly the case as the importance of brands as critical long term value creating assets is becoming ever more widely acknowledged, *inter alia* in the growing intellectual capital literature. In order to address this situation, the remainder of the paper discusses a possible means of progressing the accounting for brands project through the development of an alternative approach identified as *brand management accounting*.

#### **4. The founding principles of brand management accounting**

Before discussing the sort of information that the brand management accounting approach might encompass, it is necessary to set out some of the ideas that provide its founding principles. A key requirement for such an approach is that it is not viewed as being fundamentally either a management accounting development or a marketing management development. Rather it must be recognised as a genuinely interfunctional development, in which the two functions meet as equal partners. Interfunctionality is considered to be an advance on cross-functionality, the term used by Cravens and Guilding (1999b) to describe their preferred approach to brand valuation. The Interbrand approach well exemplifies a cross-functional approach, ultimately being rooted in a traditional functional division of labour. The assessment of brand strength is principally the task of the marketing management function while determining the profitability of brands is the preserve of the accounting and finance function. Although there will, of necessity, be some valuable sharing of information between the two functions, a feature of the Interbrand approach that Guilding and Moorhouse (1992) regards as its strongest merit, it is difficult to avoid the conclusion that in the great majority of instances, an extensive degree of specialisation will be evident. Interfunctionality requires that such practices are minimised in the pursuit of

superior business performance, *inter alia* as a consequence of adopting a greater level of market orientation.

As we noted in the previous section, Cravens and Guilding (1999a, 2000) are familiar with the market orientation concept. Despite its continuing significance within the marketing management literature since the later 1980s, it remains largely unknown and consequently unexplored by management accounting researchers. In the seminal formulations advanced by Kohli and Jaworski (1990) and Narver and Slater (1990), businesses seeking to embrace a market orientation must ensure that the various management functions abandon their traditional “silo” emphases, and instead work cooperatively to deliver value to customers. While different practitioners necessarily bring their own functional knowledges, expertises and outlooks to any business, the sign of a mature market orientation is that these are subordinate to a more inclusive interfunctional perspective. Narver and Slater (1990, p. 22) term such an interfunctional approach to cooperation *interfunctional coordination*, the merits of which are captured in the following quotation:

Creating value for buyers is much more than a “marketing function”; rather a seller’s creation of value for buyers is analogous to a symphony orchestra in which the contribution of each subgroup is tailored and integrated by a conductor...When there is no tradition of interfunctional coordination within a business, effective advocacy and leadership are needed to overcome each functional area’s isolation from the other functions. Achieving effective interfunctional coordination requires, among other things, an alignment of the functional areas’ incentives and the creation of interfunctional dependency so that each perceives its own advantage in cooperating closely with the others.

The aim of the cross-functional Interbrand approach is to derive robust financial valuations for brands. Although these may not be accorded the status of objective valuations, permitting inclusion on the balance sheet, many people are prepared to regard such valuations as being sufficiently robust to be employed in critical business decision-making situations. Underlying Interbrand approach, however, is a crude reductionism, which sees a single number distilled from two information sets. The determination of brand strength is accomplished by scoring a brand on seven attributes weighted according to their perceived significance: leadership; stability; market; internationality; trend; support; and protection. This aggregated score is then input into the S-curve brand valuation multiplier model, in which higher scoring brands are identified as having higher multipliers. The resulting multiplier is applied to a brand earnings estimate, derived from a second financial information set, to produce a brand valuation in the form of a single number that exhibits all the hallmarks of a conventional accounting number, irrespective of its cross-functional underpinnings.

By contrast, in any interfunctional approach to accounting for brands based on interfunctional coordination, the requirement to generate similar single numbers becomes redundant. In its place is the objective of providing as much information as is necessary to enhance management decision making regarding a business’s stock of brands. No premium is placed on providing as little information as possible, i.e. a single (accounting) number. The relevance of the information on offer becomes the critical criterion informing such an approach. In addition, such information is likely to be varied in character, consistent with the observation that brands themselves are multifaceted phenomena that can only be properly understood when viewed in

a variety of ways. Furthermore, incommensurability within any information set generated by such an approach should be recognised as a major strength rather than a weakness. Overall, the underlying philosophy that more is better should not be interpreted as calling for ever greater extents of information, with little concern for the resources required to provide it. The challenge is to fashion a comprehensive, balanced set of information relevant to understanding the value creation capacity of a business's stock of brands.

The scenario of the management accounting and marketing management functions cooperating closely to derive a range of information on the performance of a business's brands designed to promote better strategic brand management also resonates with the notion of intellectual capital management. As we observed earlier, brands together with kindred assets including company reputation and customer loyalty are now recognised to be part of the relational (or customer) capital of many businesses. Together with the other elements of intellectual capital, management is challenged to "grow" a business's stock of brands. While success in this regard will often result in high market-to-book ratios, management will also benefit from having ready access to detailed information about its own performance in managing a business's stock of brands. In order to provide this information, a number of internal reporting frameworks have recently been identified within the intellectual capital literature (Upton, 2001; Starovic and Marr, 2003; Fincham and Roslender, 2003). Among these frameworks is the balanced scorecard, already widely acknowledged as a powerful performance reporting model within the management accounting literature (Kaplan and Norton, 1992, 1993, 1996), and beyond. In addition, the intellectual capital literature has identified a number of similar scorecard approaches including the Skandia Navigator (Edvinsson, 1997), the intangible assets monitor (Sveiby, 1997) and the value chain scoreboard (Lev, 2001). All offer appropriate means of communicating the wide ranging information set envisaged as resulting from interfunctional coordination activities involving marketing managers and their management accountant colleagues.

### **5. Possible brand management accounting measurement metrics**

Having established the case for developing a new interfunctional approach to accounting for brands designed to promote more effective strategic brand management, consideration must now be given to the sort of information such an approach might include. In the following pages, three complementary information sets are identified and briefly discussed. Although the first set is reasonably well established in the marketing management literature, its visibility in the (management) accounting literature is presently very limited. In the pursuit of greater levels of interfunctional coordination, it merits inclusion here. The second information set exhibits a much closer affinity with accounting measures, although the detail of the measures identified may not be very familiar to many management accounting practitioners, nor to their marketing management counterparts. The third information set is regarded as significantly more novel in content and is consistent with the principle of interfunctional cooperation. This further set of softer brand performance indicators seeks to fully integrate insights from the management accounting and marketing management functions in the pursuit of more effective strategic brand management.



### 5.1 Marketing information

The most fundamental marketing management information about any brand is captured by a generic market share measure (Buzzell and Gale, 1987; Jacobson, 1988; Szymanski *et al.*, 1993). An initial measure of market share is percentage of the market currently held by a particular brand. To determine this figure requires information on the turnover for the brand and for the relevant market. An alternative measure is current market position of the brand. Underpinning this measure is information on current turnover together with information on the turnover of competing brands. All of this information is normally available in-house and from market research agencies. The same information can also be used to provide simple but important insights on the growth (or otherwise) trend associated with a particular brand, i.e. increased market share, improved market position, increased turnover and, beyond this, relative performance assessments against competing brands.

Information on the current status of brands or changes therein is historical in nature. As critical business assets delivering long-term value creation, it is necessary to complement such information with future oriented insights such as projections of anticipated turnover, market growth, competitor performance, etc. A more instructive approach, however, is to assemble information about current levels of brand awareness (Keller, 1998). Successful brands are normally familiar to large numbers of people, the general public or in the case of the business-to-business sector other businesses, irrespective of whether they currently purchase them. High levels of brand awareness provide an indication of the growth potential of a particular brand, with increasing levels of awareness being doubly encouraging. An important measure of brand awareness is brand recognition. Many brands have an icon or logo associated with them, so while a particular brand may not currently be purchased, it is important that potential customers can recognise it for future reference. Brand recall offers an alternative means of assessing levels of brand knowledge informing brand awareness. What is being measured here is potential customers' ability to identify a particular brand when questioned about a category of offerings. Consequently, it might be viewed as a better indicator of brand awareness than brand recognition.

A third set of information of importance to the long-term fortunes of particular brands relates to brand loyalty. A first measure of loyalty is the level of repeat purchases, whether of the same offering or of other offerings in the same range. A loyal customer base will be less costly to service than one that is more fluid or characterised by a high level of customer turnover ("churn"). Similarly, loyal customers are normally less difficult to satisfy since both parties have previously affirmed the strength of their relationship (Reichheld and Sasser, 1990; Dick and Basu, 1994). Consequently, it is important to measure customer retention, including length of relationship with a business and its products. Beyond this, information on the extent to which customers are prepared to refer brands to their friends is instructive, i.e. *brand referral*. To complement loyalty information, it is also valuable to determine both the current levels and bases of customer satisfaction, as well as identify the reasons for defections to competitors.

A further set of insights is particularly valuable in the case of brands. Citing work by Aaker and Biel, Feldwick (1996) observes that it is widely assumed that the associations or attributes that a brand acquires are the principal determinants of brand strength. High levels of positive brand association attract customers to brands and

continue to attract them. A variety of ideas have emerged in the brand literature to characterise such associations. Successful brands are recognised to exhibit considerable emotional appeal to those who purchase them. They contribute to feelings of well being on the part of customers, perhaps because they convey an image or personality consistent with that which customers wish to project. The necessity to provide a balance of such sentiments with the more tangible benefits that characterise products is identified in the following descriptions of successful brands:

Brands deliver a variety of benefits, which for ease can be classified as satisfying buyers' rational and emotional needs. Successful brands are those which have the correct balance in terms of their ability to satisfy these two needs (de Chernatony and McDonald, 1998, p. 21).

[S]uccessful brands are built on a combination of product benefits, mainly tangible values, and emotion, values of abstract or intangible character. It is the combination that is important, a brand building team must cover both aspects of the value spectrum or otherwise the efforts will be "limp" (Nilson, 1998, p. 73).

Many of these associations and attributes are subjective or qualitative in nature. Consequently, they may prove difficult to represent using quantitative metrics as in the three former information sets. Instead a strong case exists for incorporating a narrative approach that permits customers to articulate what they regard as being key brand associations. Such approaches offer a means of allowing brands to speak for themselves, albeit through the medium of the customer, the agency that ultimately determines whether or not any particular brand will enjoy sustained commercial success.

### 5.2 Accounting information

The initial information to be provided by the accounting and finance function is on profitability. Highly disaggregated information about the financial performance of branded offerings might be communicated using brand income statements. These are similar to those developed for product profitability analysis (Goodman, 1970; Pyne, 1984; Coulthurst, 1992), where the information produced is valued for the insights it offers rather than being capable of incorporation within the financial accounting and reporting system. Such statements identify the composition of the costs incurred in selling particular branded offerings during a trading period. Three categories of expenditure are initially identified: variable manufacturing costs; warehousing and distribution costs; and selling costs including promotions, discounts and any advertising expenditures associated with specific offerings. Overheads related to both manufacturing management and marketing management (including sales management) are then allocated to specific branded offerings. The emergence of activity-based costing (Cooper and Kaplan, 1991) has made this a less problematic task, as in the case of customer profitability analysis (Shapiro *et al.*, 1987; Bellis-Jones, 1989). Once the totality of costs is identified, this is set against revenues for the same trading period to determine the branded offering's income. Such information can be compared with that derived for kindred offerings or for a number of trading periods.

This sort of profitability information does not incorporate any charge for depreciation on capital expenditures or investments, which is arguably of benefit as such information is more usefully provided separately. Within financial accounting and reporting, such expenditures are normally not regarded as capital investments,

being expensed in full in the year in which they are incurred as period costs. In the case of expenditures on marketing campaigns designed to make consumers aware of the various branded offerings available to them, the clear intention is to produce long-term benefits. Nevertheless, the actual cash outflows identified as occurring in specific accounting periods are charged as expenses for this period in the interests of prudence. Similarly the costs of developing and maintaining customer databases, whose importance have increased with the emergence of direct marketing. Significant investment also occurs in the provision of customer service, which in the case of brands is explicitly designed to ensure high levels of retention. In the case of many branded offerings, there is a premium on ensuring that those who are employed to sell them are fully apprised of their key attributes. The resources involved in creating the necessary competences can be considerable, and as such should be regarded as long-term investments.

The development of brand investment profiles offers a means of providing information on these expenditures. Such profiles distinguish between three different categories of expenditure. First, expenditure intended to maintain a particular brand at its present level of performance. An element of this expenditure could be expensed in the relevant brand income statement, as it could be deemed "current" in nature. Second, expenditure designed to enhance a brand's performance over a longer time period. Such expenditure may be on an established brand that shows signs of being able to return sustained performance improvements. Alternatively, significant expenditure might be required for a proposed brand extension. Third, expenditure designed to rejuvenate or refresh a particular brand in the market place, perhaps providing necessary support in the short to medium term, possibly as a prelude to replacing one brand with another. Efforts should be made to provide detailed profiles for specific market offerings, as this will permit valuable comparisons across the range of such offerings. In addition to reporting aggregate level insights, i.e. of total investment expenditures, those cases in which the long term health of a particular brand(s) is problematic, e.g. where disproportionate expenditures are necessary to support a particular brand (or offering) will be highlighted.

A third set of accounting-based information will integrate income/profitability information with investment expenditures, to provide return on brand investment metrics. A promising approach is to calculate a residual income figure for the performance of a brand or specific offering. Having identified an appropriate income or earnings figure, a further charge is made for the investment funds associated with these earnings. The difficulty with such an approach is that of identifying the appropriate cost of capital charges to be applied to the various elements of the investment figure. Since these may vary over time, this variation needs to be incorporated into the capital charge to be set against the earnings figure. If variations are regarded as being only limited in extent, then it will be acceptable to use an average cost of capital figure, which must be monitored on a regular basis. Despite these practical difficulties, one company included in a recent field study of strategic management accounting practices claimed to be progressing such an exercise (Roslender and Hart, 2002, 2003). Several interviewees indicated that one element of their on-going programme of embedding Marakon Associates' value-based management philosophy (McTaggart *et al.*, 1994) in the company actively entailed identifying the economic profits for their different branded offerings.

It is envisaged that the information identified above will be provided in addition to any information already provided by the accounting and finance function in support of brand valuation activity. There is no intention that brand management accounting will displace whatever accounting practices have grown up around the long standing interest in accounting for brands from a financial accounting and reporting perspective. The two perspectives are best viewed as being complementary, in the same way that financial accounting and management accounting complement each other in organisational settings as a consequence of their common foundations and objectives. A truly comprehensive accounting for brands perspective will, therefore, incorporate complementary insights from both financial and management accounting, as well as from marketing management.

### *5.3 Interfunctional information*

Although the previous information sets are designated as marketing and accounting, respectively, producing them requires close cooperation between these functions. In the case of a third set of information, however, a higher order of cooperation is necessary. Both sets of practitioners need to fully immerse themselves in their colleagues' knowledges, and in effect begin to become functionally interchangeable with them.

Successful brands combine a set of objective, rational or functional attributes, normally associated with products (Levitt, 1980), with a fundamentally different order of features, those of a subjective, intangible or emotional nature, designed to create a defining brand image (Doyle, 1998, 1999). As the former attributes are often shared with a number of competing brands, the all-important appeal of most brands is derived largely from the latter features. This is evident in the competition between the Audi A4, BMW 3-series and Mercedes C-class brands in the (highly competitive) small executive saloon market. As bundles of objective attributes, each of these branded offerings is similar to the others, as are their prices. Consequently, competition is focused on the value delivered by the specific set of subjective, intangible or emotional features embedded within the different offerings. Here value extends beyond "value for money" considerations, however, since from the customer perspective significant personal "values" come into play. One way of conceptualising this is to view successful brands as incorporating what customers value about themselves, previously identified earlier as brand association.

Once a company has developed a successful brand, it is not in a position to name its own price. Exclusive brands aside, e.g. Cartier (watches), Rolls Royce (cars) or Lear (executive jets) where very high prices prohibit widespread purchase, there are normally limits on the price that customers are prepared to pay for a specific branded offering providing them with extensive positive brand associations. Price premiums associated with successful brands therefore need to be recognised, understood and quantified in some way. Some means of determining price premium sensitivity must be developed. Initially current levels of price premium should be estimated for specific branded offerings. Attention might then be paid to the consequences for sales of increasing such premiums, providing insights on the point at which price increases results in reduced revenues. One means of determining current levels of price premiums is to identify price differentials that presently exist with competitors' offerings. Where competitor offerings are priced at a higher level, what will the consequences if modest price increases are introduced? Alternatively, what will

happen to demand if current prices are reduced further, challenging current price premiums accruing to competitors? Even though most successful brands do not offer a license to print money, room for manoeuvre may extend some way beyond only a few pence or even pounds.

Throughout the paper emphasis has been placed on the long term value creation capacity of brands as business assets. Consequently, it is important that companies understand the long-term robustness of their brands. This is recognised in the brand strength component of the Interbrand approach, where seven strength factors are periodically assessed to determine a brand strength score. Consistent with the position adopted in this paper, i.e. assembling a greater volume of information and insights rather than seeking to reduce such information to a single, composite measure or valuation, emphasis is placed on exploring and quantifying in some way the broad range of determinants of brand robustness. Of critical importance is understanding the appeal that a particular brand has for customers, i.e. its key brand associations. More specifically, it is vital to be conscious of the sustainability of the appeal of a brand and not only its current appeal.

Customer tastes, for example, are always liable to shift in line with changes in the stock of values presently underpinning success. Adverse publicity about environmental or ethical issues may result in a loss of custom to competitors who, in turn, have identified ways of avoiding such problems without significantly affecting their profitability. For example, airlines that have invested in modern, fuel efficient, more environmentally friendly fleets may attract custom from their competitors. Likewise, businesses able to demonstrate a commitment to the “Fair Trade” philosophy or evidence of investment in the welfare of their suppliers’ indigenous workforces. Technological progress can often render hitherto successful offerings much less appealing. Businesses must, therefore, be fully aware of how important technology is in the case of their respective offerings and how costly it will be to remain in or withdraw from the technology race.

The general need to retain brand “freshness” is widely recognised as crucial to long term success. This is particularly the case where the objective is to retain a significant part of the customer base for lengthy periods of time. In the UK, Marks and Spencer has recently failed to do this, losing many of its younger women customers to more fashionable competitors including Next and Oasis, or to the (cheaper) clothing sections of supermarket chains such as Tesco and Asda. Faced with similar threats, the John Lewis Partnership introduced a series of changes in its trading philosophy designed to dispel its traditional reliable, reserved image, including embracing marketing and e-commerce. Since competitors are equally interested in attracting custom, businesses must have clear ideas about future offerings and the financial resources necessary to continue delivering at least present levels of market performance. What characterises all of this information are two complementary elements; one that relates to the customer and the values s/he embraces, the other to the expenditure associated with delivering both value and values. Because these elements form the two sides of the coin of brand success, in seeking to develop the necessary information and insights all parties must make strenuous efforts to avoid regressing towards a traditional division of labour.

The outcome of such sustainability exercises will be the provision of a set of projections on the long term health of a business’s stock of brands. This information is

valuable for identifying the most beneficial use of the available financial resources. In some instances, the cost of supporting particular brands may be prohibitive as they are no longer sufficiently robust, while to repair the situation will result in an uneconomic use of available resources. It may, therefore, be necessary to dispose of particular brands (or in some cases only the brand names) by selling them to competitors better positioned to incorporate them into their own stocks of brands. Such practices also allow businesses to purchase competitors' brands in order to strengthen their own market positions. Trading brands, e.g. hotel franchises or chains of public houses, or in the recent case of Cadbury-Schweppes disposing of many of its non-US soft drinks brands to raise funds to purchase confectionery brands worldwide, is an important feature of the market for brands. It is important that businesses are in possession of the information necessary for them to successfully participate in this market.

Rather than wait until the sustainability of a particular brand becomes a problem, it is advantageous to have information to hand on the disposability of any of the brands currently owned. Initially it is important to have some indication of what competitors are prepared to pay for any particular brand or bundle of brands. Projections on the effect such a sale will have on the future performance of the business are also required, both in terms of any loss of profit that might result counterbalanced by any gains that might occur as a consequence of transferring the financial resources now available to retained brands. Beyond this are projections on the expected benefits of using such funds to purchase additional brands from competitors. Understanding the life cycles of individual brands is important here, both in terms of how a brand is perceived by a business and its customers. While a particular brand might still have a significant appeal to customers, a business might be concerned about the level of resources it needs to allocate to the brand in order to continue to deliver value(s) to customers, preferring to redirect these resources to other brands, including those that may be acquired. As with both price premium sensitivity analysis and the determination of brand robustness and sustainability, the information needed for making disposability decisions is definitively interfunctional in character, and, therefore, presupposes the existence of high levels of cooperation between the accounting and marketing functions.

### **6. In conclusion: the prospects for interfunctional cooperation**

These three information sets will furnish a considerable volume of information. Nevertheless, it should not be imagined that what has been identified in the previous paragraphs constitutes an exhaustive compendium of brand management accounting metrics. They are intended to be indicative of the information that management accountants and marketing managers working cooperatively might contribute to the strategic brand management process. In individual organisations, the precise form that the composite information set assumes will necessarily reflect the perceived requirements of the organisation. In short, there can be no "off the shelf" package of brand management accounting metrics that must be implemented. Specific metrics and indicators are valued for their "relevance" to the task at hand rather than their perceived "reliability", a view that has informed management accounting developments for almost two decades (Johnson and Kaplan, 1987). Consequently, all those involved in brand management accounting are envisaged as being engaged in

a challenging, on-going learning experience, the outcome of which depends very much on their capacity achieve the necessary high levels of interfunctional cooperation.

In this context, a crucial issue is whether members of the management accounting section of the broader profession (in the first instance) are willing to engage in the requisite level of cooperation with its marketing counterpart? There is little evidence in the literature that the accountancy profession has entertained a view parallel to that advanced by Narver and Slater (1990), quoted at length in Section 4 above. Several years earlier Armstrong (1985, 1986) had argued that the accountancy profession had been extremely successful in the competition between the professions for organisational dominance, as a result of which its characteristic management control strategy was widely regarded as offering the most effective means of controlling organisations. If Armstrong is correct, then management accountants would seem to have little to gain from exchanging a highly successful exclusive approach to the challenges of organisational management for one that is characteristically inclusive, as in the case of marketing management's market orientation philosophy. What benefit could there be in willingly cooperating with a rival (and hitherto less successful) profession to develop a further approach to accounting for brands that to many management accountants must appear to be some distance removed from their conceptions of what accounting is concerned with, and thereby necessitate extensive learning? A cynic might well conclude that brand management accounting promises rather more to marketing managers than it does to their management accounting colleagues. This may also go some way to explaining why Guiding and his colleagues have consistently reported greater levels of support for their management accounting for brands approach among marketing practitioners.

Without wishing to underestimate the considerable practical difficulties entailed in establishing the levels of interfunctional cooperation necessary to successfully develop the brand management accounting approach outlined above, there are some encouraging signs. The contemporary management accounting sub-discipline is very different to that which existed in the mid 1980s. One of the defining characteristics of the "new" management accounting has been a willingness to explore inclusive developments in fashioning a more relevant, even "strategic", management accounting discipline (Roslender, 1995). This is very evident in the introductory chapters of most introductory management accounting textbooks, which now discuss key business and management themes and the various professional functions associated with them. Some important recent developments within management accounting, including value chain analysis, target cost management, strategic management accounting and the balanced scorecard, incorporate a distinctly inclusive emphasis. Equally, developments such as activity-based costing, throughput accounting and benchmarking are also less introspective than most predecessor techniques.

Finally, particularly encouraging are a number of the findings of Roslender and Hart's (2002, 2003) field study of the implementation of strategic management accounting practices in the UK. They found only limited evidence that techniques normally associated with strategic management accounting, such as target costing, life cycle costing, strategic cost analysis and attribute costing, were being implemented in their sample of ten companies. More significantly, however, they report that in the majority of companies they were able to identify examples of the sort of interfunctional cooperation between the management accounting and marketing management

functions necessary for the development of the brand management accounting approach. In five companies accounting and marketing practitioners were engaged in jointly exploring the utility of “new” management accounting techniques such as customer profitability analysis, benchmarking and activity-based management. Roslender and Hart identify such cooperation as a necessary basis for more ambitious and potentially fruitful cooperation in the form of “synergistic” relationships between the two functions. Three companies provided some evidence of the existence of such cooperation and relationships, with the stock of brands presently owned by the companies being one of the key focuses for attention. Although it could not be claimed that any of the latter group of companies pursued a systematic approach to brand management accounting of the sort identified in the previous section, there were encouraging signs that they might move in this direction over time. Since brand management accounting is underpinned by an attempt to integrate insights from management accounting and marketing management within a strategic management framework, which is how Roslender and Hart view the generic strategic management accounting approach, it clearly merits inclusion within the latter designation as a promising new departure within accounting for strategic management.

### References

- Armstrong, P. (1985), “Competition between the organizational professions and the evolution of management control strategies”, *Accounting, Organizations and Society*, Vol. 10 No. 2, pp. 129-48.
- Armstrong, P. (1986), “Management control strategies and interprofessional competition: the case of accountancy and personnel management”, in Knights, D. and Willmott, H.C. (Eds), *Managing the Labour Process*, Gower, London, pp. 19-43.
- ASB (1997), *FRS 10: Goodwill and Intangible Assets*, Accounting Standards Board, London.
- ASB (1998), *FRS 11: Impairment of Fixed Assets and Goodwill*, Accounting Standards Board, London.
- Barwise, P., Higson, C., Likierman, A. and Marsh, P. (1989), *Accounting for Brands*, London Business School and the Institute of Chartered Accountants in England and Wales, London.
- Bellis-Jones, R. (1989), “Customer profitability analysis”, *Management Accounting (UK)*, Vol. 67 No. 2, pp. 26-8.
- Buzzell, R.D. and Gale, B.T. (1987), *The PIMS Principles: Linking Strategy to Performance*, The Free Press, New York, NY.
- Cooper, R. and Kaplan, R.S. (1991), “Profit priorities form activity-based costing”, *Harvard Business Review*, Vol. 69 No. 3, pp. 130-5.
- Coulthurst, N. (1992), “Management accounting in retail organisations”, in Drury, C. (Ed.), *Management Accounting Handbook*, Butterworth-Heinemann, London, pp. 217-33.
- Cravens, K.S. and Guilding, C. (1999a), “Examining brand valuation from a management accounting perspective”, *Advances in Management Accounting*, Vol. 8, pp. 113-37.
- Cravens, K.S. and Guilding, C. (1999b), “Strategic brand valuation: a cross-functional perspective”, *Business Horizons*, Vol. 42 No. 4, pp. 53-62.
- Cravens, K.S. and Guilding, C. (2000), “Measuring customer focus: an examination of the relationship between market orientation and brand valuation”, *Journal of Strategic Marketing*, Vol. 8 No. 1, pp. 27-45.



- Cravens, K.S. and Guilding, C. (2001a), "Brand value accounting: an international comparison of perceived managerial implications", *Journal of International Accounting, Auditing and Taxation*, Vol. 10 No. 2, pp. 197-221.
- Cravens, K.S. and Guilding, C. (2001b), "An empirical study of the application of strategic management accounting techniques", *Advances in Management Accounting*, Vol. 10, pp. 95-124.
- de Charnatony, L. and McDonald, M. (1998), *Creating Powerful Brands in Consumer, Service and Industrial Markets*, Butterworth-Heinemann and the Chartered Institute of Marketing, London.
- Dick, A.S. and Basu, K. (1994), "Customer loyalty: toward an integrated conceptual framework", *Journal of the Academy of Marketing Science*, Vol. 22 No. 2, pp. 99-113.
- Doyle, P. (1998), *Marketing Strategy and Management*, 2nd ed., Prentice-Hall Europe, London.
- Doyle, P. (1999), "Branding", in Baker, M.J. (Ed.), *The Marketing Book*, 4th ed., Butterworth-Heinemann and the Chartered Institute of Marketing, London, pp. 364-78.
- Edvinsson, L. (1997), "Developing intellectual capital at Skandia", *Long Range Planning*, Vol. 30 No. 3, pp. 366-73.
- Egan, C. and Guilding, C. (1994), "Dimensions of brand performance: challenges for marketing management and management accountancy", *Journal of Marketing Management*, Vol. 10 No. 6, pp. 449-72.
- Feldwick, P. (1996), "What is brand equity anyway and how do you measure it?", *Journal of the Market Research Society*, Vol. 6, pp. 43-77.
- Fincham, R. and Roslender, R. (2003), *The Management of Intellectual Capital and its Implications for Business Reporting*, The Institute of Chartered Accountants of Scotland, Edinburgh.
- Goodman, S.R. (1970), *Techniques in Profitability Analysis*, Wiley, New York, NY.
- Guilding, C. (1992), "Should management accounting take up the brand valuation challenge?", *Management Accounting (UK)*, Vol. 70 No. 6, pp. 44-55.
- Guilding, C., Cravens, K.S. and Tayles, M. (2000), "An international comparison of strategic management accounting practices", *Management Accounting Research*, Vol. 11 No. 1, pp. 113-35.
- Guilding, C. and Moorhouse, M. (1992), "The case for brand value budgeting", in Drury, C. (Ed.), *Management Accounting Handbook*, Butterworth-Heinemann, London, pp. 172-95.
- Guilding, C. and Pike, R. (1990), "Intangible marketing assets: a managerial accounting perspective", *Accounting & Business Research*, Vol. 21, pp. 41-9.
- Guilding, C. and Pike, R. (1994a), "Brand valuation: a model and empirical study of organisational implications", *Accounting & Business Research*, Vol. 24, pp. 241-53.
- Guilding, C. and Pike, R. (1994b), "An exploratory study of the managerial implications of valuing brands", *British Journal of Management*, Vol. 5 No. 2, pp. 101-11.
- Haigh, D. (1997), "Brand valuation or brand evaluation: that is the question?", available at: [www.brandfinance.com](http://www.brandfinance.com)
- IASB (2004), *IFRS 3: Business Combinations*, International Accounting Standards Board, London.
- IASC (1998), *IAS 38: Intangible Assets*, International Accounting Standards Committee, London.
- Jacobson, R. (1988), "Distinguishing among competing theories of the market share effect", *Journal of Marketing*, Vol. 52 No. 4, pp. 68-80.
- Johnson, H.T. and Kaplan, R.S. (1987), *Relevance Lost: The Rise and Fall of Management Accounting*, Harvard Business School Press, Boston, MA.

- Kapferer, J.-N. (1998), *Strategic Brand Management: Creating and Sustaining Brand Equity Long Term*, Kogan Page Limited, London.
- Kaplan, R.S. and Norton, D.P. (1992), "The balanced scorecard: measures that drive performance", *Harvard Business Review*, Vol. 70 No. 1, pp. 58-63.
- Kaplan, R.S. and Norton, D.P. (1993), "Putting the balanced scorecard to work", *Harvard Business Review*, Vol. 71 No. 5, pp. 134-47.
- Kaplan, R.S. and Norton, D.P. (1996), *The Balanced Scorecard: Translating Strategy into Action*, Harvard Business School Press, Boston, MA.
- Keller, K.L. (1998), *Strategic Brand Management: Building, Measuring and Managing Brand Equity*, Prentice-Hall, Upper Saddle River, NJ.
- Kohli, A.K. and Jaworski, B.J. (1990), "Market orientation: research propositions and managerial implications", *Journal of Marketing*, Vol. 54 No. 2, pp. 1-18.
- Lev, B. (2001), *Intangibles: Management, Measurement and Reporting*, Brookings Institution Press, Washington, DC.
- Levitt, T. (1980), "Marketing success through differentiation – of everything", *Harvard Business Review*, Vol. 29 No. 1, pp. 57-71.
- Low, G.S. and Fullerton, R.A. (1994), "Brands, brand management and the brand manager system. A critical historical evaluation", *Journal of Marketing Research*, Vol. 31 No. 2, pp. 173-90.
- Lynn, B. (1998), *The Management of Intellectual Capital: The Issues and the Practice*, Society of Management Accountants of Canada, Hamilton.
- McTaggart, J.M., Kontes, P.W. and Mankins, M.C. (1994), *The Value Imperative: Managing for Superior Shareholder Returns*, The Free Press, New York, NY.
- Morgan, H. (1986), *Symbols of America*, Viking Press, New York, NY.
- Mouritsen, J. (1998), "Driving growth: economic value added vs intellectual capital", *Management Accounting Research*, Vol. 9 No. 4, pp. 461-82.
- Murphy, J. (Ed.) (1989), *Brand Valuation – Establishing a True and Fair View*, Hutchinson, London.
- Narver, J.C. and Slater, S.F. (1990), "The effect of a market orientation on business profitability", *Journal of Marketing*, Vol. 54 No. 4, pp. 20-35.
- Nilson, T.N. (1998), *Competitive Branding: Winning in the Market Place with Value Added*, Wiley, Chichester.
- Ong, A. (2001), "Changes in brand accounting for UK companies", *Journal of Brand Management*, Vol. 9 No. 2, pp. 116-26.
- Penrose, N. and Moorhouse, M.J. (1992), *The Valuation of Brands*, Interbrand Group plc and Ranks Hovis McDougall, London.
- Power, M. (1992), "The politics of brand accounting in the United Kingdom", *European Accounting Review*, Vol. 1 No. 1, pp. 39-68.
- Pyne, F.G. (1984), "Better operating statements for the marketing director", *Accountancy*, Vol. 95, pp. 87-90.
- Reichheld, F.E. and Sasser, W.E. (1990), "Zero defections: quality comes to services", *Harvard Business Review*, Vol. 68 No. 5, pp. 105-11.
- Roslender, R. (1995), "Accounting for strategic positioning: responding to the crisis in management accounting", *British Journal of Management*, Vol. 6 No. 1, pp. 45-57.

- 
- Roslender, R. and Hart, S.J. (2002), *Marketing and Management Interfaces in the Enactment of Strategic Management Accounting Practices: An Exploratory Investigation*, CIMA Publishing, London.
- Roslender, R. and Hart, S.J. (2003), "In search of strategic management accounting: theoretical and field study perspectives", *Management Accounting Research*, Vol. 14 No. 3, pp. 255-79.
- Shapiro, B.P., Rangan, V.K., Moriarty, R.T. and Ross, E.B. (1987), "Manage customers for profit (not just sales)", *Harvard Business Review*, Vol. 65 No. 5, pp. 101-8.
- Slater, S.F., Olson, E.M. and Reddy, V.K. (1997), "Strategy-based performance measurement", *Business Horizons*, Vol. 40 No. 4, pp. 37-44.
- Starovic, D. and Marr, B. (2003), *Understanding Corporate Value: Managing and Reporting Intellectual Capital*, Chartered Institute of Management Accountants, London in conjunction with Cranfield University.
- Sveiby, K-E. (1997), "The intangible assets monitor", *Journal of Human Resource Costing & Accounting*, Vol. 2 No. 1, pp. 73-97.
- Szymanski, D.M., Bharadwaj, S.G. and Varadarajan, P.R. (1993), "An analysis of the market share – profitability relationship", *Journal of Marketing*, Vol. 57 No. 3, pp. 1-18.
- Upton, W.S. (2001), *Business and Financial Reporting, Challenges from the New Economy*, Financial Accounting Standards Board, Norwalk, CT.

**Corresponding author**

Robin Roslender can be contacted at: [R.Roslender@hw.ac.uk](mailto:R.Roslender@hw.ac.uk)

---

To purchase reprints of this article please e-mail: [reprints@emeraldinsight.com](mailto:reprints@emeraldinsight.com)  
Or visit our web site for further details: [www.emeraldinsight.com/reprints](http://www.emeraldinsight.com/reprints)

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.