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DOES THE BALANCED SCORECARD WORK: AN EMPIRICAL INVESTIGATION

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Research Paper no. 1/08

DOES THE BALANCED SCORECARD WORK: AN EMPIRICAL INVESTIGATION

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Abstract

Commentators suggest that between 30 and 60% of large US firms have adopted the Balanced Scorecard, first described by Bob Kaplan and David Norton in their seminal Harvard Business Review paper of 1992 (Kaplan and Norton, 1992; Marr *et al*, 2004). Empirical evidence that explores the performance impact of the balanced scorecard, however, is extremely rare and much that is available is anecdotal at best. This paper reports a study that set out to explore the performance impact of the balanced scorecard by employing a quasi-experimental design. Up to three years worth of financial data were collected from two sister divisions of an electrical wholesale chain based in the UK, one of which had implemented the balanced scorecard and one of which had not. The relative performance improvements of geographically matched pairs of branches were compared to establish what, if any, performance differentials existed between the branches that had implemented the balanced scorecard and those that had not. The key findings of the study are that while the Electrical division – the division that implemented the balanced scorecard – sees improvements in sales and gross profit; similar performance improvements are also observed in the sister division. Hence the performance impact of the balanced scorecard has to be questioned. Clearly further work on this important topic is required in similar settings where natural experiments occur.

Keywords: performance measurements, performance management, performance impact, balanced scorecard.

1. Background and Context

Commentators suggest that between 30 and 60% of large US firms have adopted the Balanced Scorecard, first described by Bob Kaplan and David Norton in their seminal paper of 1992 (Frigo and Krumwiede, 1999; Frigo, 2000). Despite this impressive take up, however, there is a paucity of empirical evidence that explores the performance impact of the balanced scorecard and indeed of performance measurement systems more generally (Franco-Santos *et al*. 2007; Melnyk *et al*. 2004). In fact the extant literature has tended to focus on the problems with traditional measurement systems and how these can be overcome with alternative measurement methods and frameworks, such as the Balanced Scorecard and the Performance Prism (Kaplan and Norton, 1992; Neely *et al*., 2002). As a result much work has been carried out on the design and deployment of measurement systems, but relatively little on their impact (Bourne *et al*., 2000; Neely *et al*., 2000).

The aim of this paper is to explore the performance impact of balanced scorecards. The paper draws on data gathered over three-year period from a major wholesaler of electrical components in the UK, referred to as Electrical. The board of Electrical decided to implement a balanced scorecard in late 1999 and began working on the design of their balanced scorecard in early 2000. They spent six months completing the design phase of the process and a further six months rolling the balanced scorecard out across their UK branch network. On 1st January 2001 the balanced scorecard was formally launched and from that day the business stopped releasing information on branch profitability, which previously had been the main method of branch measurement. They also changed the firm's incentive scheme, moving away from a bonus based on branch profitability and to a bonus based on performance against the balanced scorecard.

Importantly, mid-way during the rollout phase of the project (in the 3rd quarter of 2000), Electrical was acquired by another UK wholesaler of electrical components. The acquiring company – referred to in the paper as Sister – continued to use traditional methods of performance reporting at the branch level, namely profit and loss accounts, throughout 2001. This situation presented the researchers with a valuable opportunity – effectively a naturally occurring experiment. In essence the research team was able to construct a sample of 56 pairs of matched branches (based on location), drawn from the samples provided by Electrical and Sister. One branch in each matched sample had adopted the balanced scorecard while the other had not. This matched sampling technique, known as quasi-experimental design, is a powerful methodology for assessing the impact of organizational changes (Cook and Campbell, 1979). In this study, the matched sample provided two particularly valuable controls. First, because both divisions essential sold the same products to the same range of customers, many sectoral differences are accounted

for. Second, the geographic matching controls for local economic activity – both in terms of demand and in terms labour availability – two key determinants of branch performance.

The rest of the paper consists of five main sections. In the first the relevant literature is explored, as this sets the scene for the study. In the second the methodology used in this study is explained and justified. The third section presents a summary of the balanced scorecard design and deployment process used by the firm. This is important as one of the potential criticisms of this research – namely that the balanced scorecard was poorly designed and deployed in negated when one considers how carefully the organisations approached the design and deployment of their balanced scorecard. The fourth section presents the quantitative analysis of the impact of the balanced scorecard, using branch level performance data. These data are compared to performance data from Electrical's sister company, which as already discussed had not implemented the balanced scorecard at that time. The fifth and final section of the paper summarises the implications of this research for both the practitioner and academic audiences.

2. The Impact of Performance Measures – Relevant Literature

The shortcomings and dysfunctional consequences of performance measurement systems have been discussed in the academic literature for at least fifty years (Ridgway, 1956), but recently there has been a flurry of activity (Chenhall, 2005; Norreklit, 2000; Norreklit, 2003). Throughout the 1980s vocal and influential authors criticised the measurement systems used by many firms (Johnson and Kaplan, 1988; Hayes and Abernathy, 1980). By the 1990s the noise made by these voices had grown to a crescendo (Melnyk *et al*., 2004; Neely *et al*., 1995; Neely, 1999) and increasing numbers of firms appeared to be "re-engineering" their measurement systems, with data suggesting that between 1995 and 2000, 30 to 60% of companies transformed their performance measurement systems (Frigo and Krumwiede, 1999; Frigo, 2000). Evidence suggests, for example, that by 2001 the balanced scorecard had been adopted by 44% of organisations worldwide (57% in the UK, 46% in the US and 26% in Germany and Austria). And more recent data suggests that 85% of organisations had performance measurement system initiatives underway by the end of 2004 (Marr *et al*., 2004; Rigby, 2001; Rigby, 2005; Silk, 1998; Speckbacher *et al*., 2003). However, cautionary evidence from three Austrian academics reported that 8% of 174 companies from German speaking countries decided not to implement a performance measurement system (and a balanced scorecard in particular) because they could not see advantages or 'positive impact', especially given the implementation effort required (Speckbacher *et al*., 2003).

Somewhat surprisingly (especially given all of this activity) there has been relatively little empirical research into whether the balanced scorecard actually works. In fact this criticism can be levelled at the field of performance measurement more generally, which has seen much prescription, but relatively little empirical research (Franco-Santos *et al*. 2007). Kaplan and Norton have made some efforts to demonstrate the impact of the balanced scorecard, but their approach has been to use largely anecdotal cases (Kaplan and Norton, 2001). An important and notable exception is the work of Chris Ittner and David Larcker, who report that only 23% of organizations that they surveyed consistently built and tested causal models to underpin their measurement systems, but that these 23% achieved 2.95% higher return on assets and 5.14% higher return on equity (Ittner and Larcker, 2003).

Similar studies, executed less robustly, have been undertaken by consultancy and commercial research firms. These studies tend to suggest that organisations managed through 'balanced' performance measurement systems perform better than those that are not (Gates, 1999; Lingle and Schiemann, 1996). Lingle and Schiemann (1996) report evidence that organisations making more extensive use of financial and non-financial measures and linking strategic measures to operational measures have higher stock market returns (Lingle and Schiemann, 1996). While Lawson *et al*'s (2003) study shows that the use of a performance measurement system as a management control tool reduces overhead costs by 25% and increases sales and profits (Lawson *et al*. 2003). Other authors, such as de Waal (2003) and Sandt *et al* (2001), report less tangible benefits from the use of performance measurement systems (de Waal, 2003; Sandt *et al*. 2001). Dumond (1994) and Sandt *et al* (2001) suggest that using balanced performance measurement systems improves the decision-making performance of managers and employees (de Waal, 2003; Dumond, 1994). Lawson *et al* (2003) and Dumond (1994) found that using performance measurement systems and linking scorecards to compensation significantly increased employee satisfaction, although Ittner *et al*. (2003b) present evidence to the contrary (Dumond, 1994; Ittner *et al*., 2003b; Lawson *et al*., 2003).

Ketelhohn (1999) and Vasconcellos (1988) found that the identification and selection of appropriate measures and key performance indictors enhance the implementation and acceptance of business strategy, at the same time as enhancing employee understanding of the business (Ketelhohn, 1998; Vasconcellos, 1988). Furthermore, Forza and Salvador's research (2000, 2001) supports the suggestion that employee communication that focuses on feedback from measures increases collaboration and facilitates buy-in (Forza and Salvador, 2000; Forza and Salvador, 2001).

In recent years there have been some attempts to evaluate the impact of the balanced scorecard more robustly. Perhaps the best examples are the studies reported by (Davis and Albright, 2004; Ittner *et al*., 2003a; Malina and Selto, 2001). The study by Ittner *et al* (2003a) explored the performance of impact of the balanced scorecard and the associated

incentive scheme in a global financial services firm (Ittner *et al*., 2003a). This study is rather critical of the balanced scorecard, arguing that the inherent subjectivity in the incentive scheme associated with the balanced scorecard undermined the credibility of the balanced scorecard in the organisation. Malina and Selto (2001) studied the operation of the balanced scorecard in multiple divisions of a large international manufacturing firm. They conclude that the balanced scorecard, as designed and implemented, proved an effective device for controlling corporate strategy, but they provide limited empirical evidence to support this assertion (Malina and Selto, 2001).

The final study – the one reported by Davis and Albright (2004) – most closely resembles the study reported in this paper. The Davis and Albright (2004) study uses a control group to evaluate the performance impact of the balanced scorecard. Davis and Albright (2004) select nine matched pairs of branches in the banking sector and compare their performance. This study finds evidence of superior financial performance in those branches that adopt the balanced scorecard (Davis and Albright, 2004). In essence, the research reported in this paper adopts a similar methodology to the Davis and Albright study, but bases the study on a far larger data set – 56 matched pairs of branches instead of 9 - and three years worth of financial data rather than two.

3. Research Methodology and Questions

As stated already, the aim of the research reported in this paper was to address the question - what is the performance impact of the balanced scorecard? To address this question the authors decided to adopt the quasi-experimental design methodology advocated by (Cook and Campbell, 1979). Core to the experimental design was the authors' involvement (over an extended period) in the design and deployment of a balanced scorecard in a multi-branch electrical wholesale business based in the UK. The author worked with the board of the business and other members of the firm's senior management team over a two-year period, facilitating the design and deployment of their balanced scorecard. The length and extent of this involvement delivered significant benefits to the research in several ways. Firstly, the author's involvement in the entire design and deployment process gave him detailed insight and valuable contextual information, which was used in the subsequent data analysis. Second, the author was able to obtain unparalleled access to the organisation and particularly highly sensitive and confidential performance data.

In essence the author was able to access sales and profitability data from two sister organizations. The first, Electrical, was the one which implemented the balanced scorecard in January 2001, following a one year design and deployment process. Electrical provided data for 122 branches. The second company, Sister, continued to use traditional methods of performance reporting throughout the period of the study and provided data

from 190 branches. These two sets of data were compared and branches based in the same location were matched. This matching by location enabled the research to compare changes in organizational performance over the duration of the study, while controlling for local economic conditions, product range and customer base.

Before the financial data are presented, the balanced scorecard design and deployment process adopted by the firm will be explained. The description of the design and deployment processes is central to the rest of the paper as it illustrates the effort that the firm put into designing and deploying their balanced scorecard, thereby negating one potential criticism of this paper – namely that the balanced scorecard being evaluated is simply a poorly designed one.

4. The Design and Deployment of Electrical's Balanced Scorecard

Electrical's history is an interesting one. Established late in the 19th century, the business had an annual turnover of over £200 million and held 8.5% of the UK's market share in 2002. A decade earlier the situation had been rather different. Electrical was a traditional family business until the early 1990s. The organisation was tightly controlled and highly centralised. Power rested with two members of the family and their inner circle. Generally the external perception of the business was that it was old-fashioned and offered no particular threat to its competitors.

In 1993 a new Managing Director was appointed. As well as bringing new ideas, he engaged in a significant change programme. New IT systems were introduced, a new national distribution centre was constructed and processes were streamlined. The branch managers, who previously had been tightly managed from the centre, were encouraged to be more entrepreneurial, acting as if they were "running their own businesses". The impact of these changes was dramatic. Over a five year period Electrical experienced significant growth. Revenues increased from £50 million to £200 million, market share from 2% to 8.5% and the business delivered 5 consecutive years of 30% profit growth.

The Need for Change

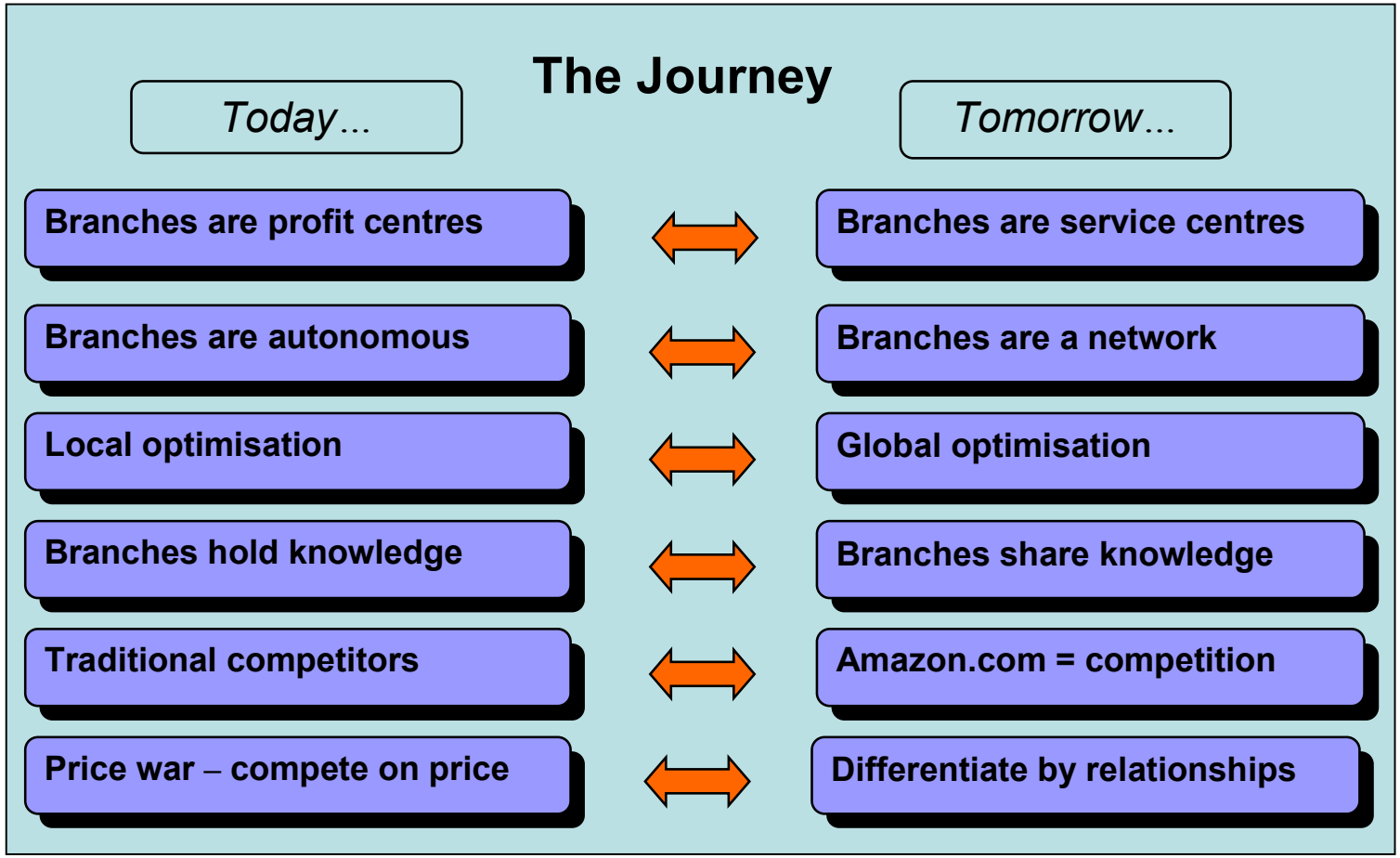
While this new entrepreneurial culture resulted in business success, it also encouraged some destructive behaviour. A key part of the culture change that the new Managing Director introduced was to encourage branch managers to behave as if they were running their own businesses. The branch managers were incentivised to be entrepreneurial, constantly seeking out new business opportunities [to reinforce this branch manager bonus payments were based on branch profitability. One consequence of this was that different

branches would compete with one another for the same order. Under the accounting system employed by the business the branch that delivered the order was credited with the sale, so it was in every branch managers' financial interest [because of the bonus scheme] to ensure that their branch won every order they could. Not surprisingly this resulted in situations where one of Electrical's branches would undercut another of Electrical's branches to win an order. Effectively the branches traded away margin to beat their sister branches in bidding wars.

In addition to competing for orders the competition between branches meant that there was very limited sharing of information between branches. Electrical's customers exhibit some interesting behaviours which make the lack of information sharing unusually problematic. The work for electricians is geographically dispersed, with much of the UK building work taking place in the South of the country. Yet electricians are remarkably loyal to their home branch. Indeed it is clear from the interactions that take place in the branches that many of the branch staff count their customers among their friends. When an electrician is working away from home – for example, an electrician based in Newcastle is working in London – the electrician will tend to phone their home branch to request product. The electrician working in London will phone the Newcastle branch to ask for 200 light bulbs. Rather than the Newcastle branch saying to the electrician, "we have a branch in London that can deliver those to you", he would arrange a special delivery [from Newcastle to London – cities which are 300 miles apart]. The reason is simple, if the Newcastle branch delivers the light bulbs then the Newcastle branch is credited with the sale and hence their profit figures look better, particularly if they can deliver other products to customers in Middlesborough, Darlington, York, Durham, Peterborough and Cambridge on the way to London. The problem, of course, is that all of these cities have existing Electrical branches capable of delivering the product more quickly and more cheaply [the net transport costs would be lower], but the measurement and incentive schemes in the business were structured in a way that discouraged the more efficient behaviour of passing orders from one branch to another.

As the business grew the impact of these behaviours became more pronounced and more noticeable and so in 2000 the board of Electrical began considering how they might change the measurement and incentive schemes used in the business. After due consideration and consultation the board made the decision to adopt a balanced scorecard and explicitly seek to design a measurement and associated incentive scheme that would encourage a further change in behaviour. Based on a slide that the business subsequently used in the balanced scorecard communication programme, figure 1 summarises the behavioural and attitudinal changes that the business was seeking to encourage.

Figure 1: Electrical's Journey – Slide Used in the Cascade and Communication Programme



Designing the Balanced Scorecard

The design and deployment of Electrical's balanced scorecard consisted of the three phases, as suggested in the literature (Bourne *et al*. 2000). The first phase, which ran from January to May 2000 involved identifying what and how to measure, along with construction of the bonus scheme. The second phase, which ran from June to December 2000, involved deploying the balanced scorecard – cascading the scheme across the business and creating the necessary supporting infrastructure. The balanced scorecard was formally launched on 1st January 2001 and the third phase – ongoing support – followed this.

During the design phase the top management team – in this case the executive board – were intimately involved in identifying what and how to measure. They followed well established processes for designing balanced scorecards prescribed in the literature (Bourne *et al*, 2002; Kaplan and Norton, 2000; Neely *et al*, 2002b). They began by creating a success map for the business which articulated their theory about how the business worked and only when they had considered this did the board turn to the question of what to measure. They spent considerable time debating and refining the actual performance measures, again using materials well described in the academic literature (Neely *et al*., 1997). Throughout this process the board consulted widely with other key stakeholders in the business. Workshops were held with influential groups of managers, including the regional managers, who were seen as central to the successful implementation of the scheme.

As well as working on the identification and definition of measures, the board also spent time in the design phase considering how the firms' incentive schemes should be redesigned when the balanced scorecard was implemented. Having completed these activities the balanced scorecard project moved into its second phase – deployment.

Scorecard Deployment

A key element of the deployment phase was the creation of so-called "balanced scorecard champions". As mentioned previously, the regional managers were seen as key influencers in the successful design and deployment of the balanced scorecard. Each regional manager had full financial and operational responsibility for one of eight regions in the UK. Typically they had 15-20 branch managers reporting to them. The regional managers were given a series of three two–day executive education courses on the balanced scorecard. The first of these courses was introductory and involved an explanation of the balanced scorecard – what it was and how it worked – as well as a review of Electrical's balanced scorecard. Throughout this course the regional managers were encouraged to comment on Electrical's scorecard, highlighting any concerns they had about it. The second course was

more in-depth and involved an exploration of the four perspectives on Electrical's balanced scorecard – financial, customer, operational and people [which replaced the innovation and learning perspective]. During this course the regional managers were exposed to the latest thinking in these four areas. The final two-day course involved consideration of the change process. As well as sessions on change management, the regional managers participated in substantive debates about how the balanced scorecard should be cascaded through the business.

To support the cascade process a series of eight one-day regional workshops were held for the branch managers. Each regional manager invited all of their direct reports to a regional workshop. These workshops, which were delivered by a professional educator, were designed to introduce the balanced scorecard to the branch managers. The managing director of the business came for the last hour of each of these regional workshops to answer any questions the branch managers wanted to raise.

Having completed their workshops the regional and branch managers delivered standard cascade presentations to the branch staff. The cascade presentation was designed by the regional management team, with the support of a professional educator and delivered by the regional managers to everyone in the business during a series of evening workshops. It is important to note that this business was not one that had invested heavily in training and education previously. In informal discussions with the author many people in the business commented that the level of investment made in the balanced scorecard project illustrated how seriously the business was taking it. Indeed the Managing Director described the balanced scorecard project as "the most significant change we have undertaken for a decade".

In parallel to training and education the development team continued to work with the finance and IT functions to create "dummy" scorecard reports and ensure that the necessary data for reporting purposes were available. Between August and December the business began releasing "dummy" scorecard reports to the branches. The "dummy" reports were sent with the monthly profit and loss reports that the branches had traditionally received, but were accompanied with a note explaining that from the 1st January the "dummy" reports were the only reports that branches would receive – i.e. the business would no longer release to branch managers their own profit and loss accounts.

This change – the decision not to release monthly profit and loss accounts - was extremely controversial when it was first announced. Indeed at the regional workshops there was typically a stunned silence when the branch managers were told that from 1st January 2001 they would no longer be receiving their branch's profit and loss account. Only when the branch managers understood all of the measures on the balanced scorecard [which included many of the elements that made up the profit and loss account] were the signs of disbelief suspended.

Changing the Incentive Scheme

The balanced scorecard was formally launched in the business on 1st January 2001. From that day the firm's bonus scheme was coupled to the balanced scorecard for all branch managers and staff. The firm adopted a bonus scheme where the bonus paid to individual branches was based on two factors – the branch's performance and the company's overall performance[1]. Branches earned points based on their performance against the performance measures on the balanced scorecard. For every measure red, amber and green target zones were set. When branches performed in the green zone they earned 3 points, the amber zone 1.5 points and the red zone 0 points. The scorecard reports released to the branch managers each month included the running total number of points that the branch had earned that year.

The value of the points was based on the firm's overall profitability. The board set aside a bonus fund that grew in relation to the firm's overall profitability. Below a minimum threshold the firm's profit was unacceptable and so no bonus was paid. When the threshold was reached the firm's guaranteed to pay a minimum of £3 million, for example, in bonus payments. There was no ceiling on the bonus fund. The more profit the firm generated the greater the amount of money paid into the bonus fund.

To calculate the value of each point, the firm calculated the total number of points earned by all branches and divided the total bonus fund [based on the firm's profitability] by the total number of points earned. The advantage of this scheme is that it encouraged branch managers and staff to think about overall company profitability, as well as the performance of their branch.

Additional Support and Encouragement

To further reinforce the message about the importance of the balanced scorecard the business put in place a number of other initiatives. First, a scorecard steering committee, chaired by the HR Director was established. The scorecard steering committee oversaw the implementation of the balanced scorecard, monitoring how well the scheme was working and identifying what additional support was required. As well as gathering informal feedback the steering committee established a set of formal scorecard reviews, calling together all of the regional managers once a month to gather their opinions on the balanced scorecard and how well it was working.

One of the common requests from the branches was for improved drill down information – information that would allow the branch managers to identify the root causes of problems

[1] The bonus was paid to the branch and then allocated to individual members of staff by the branch manager, in discussion with the regional manager.

identified by the measures on the balanced scorecard. The steering committee commissioned work from the IT department to address this issue, as well as establishing a small group who could resolve questions and queries about the data contained in the scorecard reports.

Given the structure of the business – largely homogeneous branches – the consistent performance measures applied to the branches offered significant opportunities for benchmarking and the identification and sharing of good practices. The regional managers used the balanced scorecards to compare the relative performance of branches within their regions as well as comparing the performance of branches across regions. Where significant differences in performance were identified the regional managers set out to explore why these differences existed and to identify whether there were any specific practices they could transfer from one branch to another. One of the measures on the balanced scorecard – the internal performance audit – further encouraged this activity. In essence the internal performance audit was an audit of branch practices. Regional managers were expected to audit the performance of the branches in their region, assessing their performance against a number of standards – e.g. external appearance, trade counter, warehouse, systems and procedures, staff, customers and back office. Undertaking this audit forced regional managers to look in detail at the practices adopted by specific branches, thereby enabling them to identify examples of good practices that they could communicate to others.

Clearly the theme of communication ran heavily throughout the implementation of the balanced scorecard in Electrical. As well as all of the education and awareness raising activities, the business established a formal communication programme to emphasise the importance of the scheme. They adopted the cartoon character Popeye as a symbol. All communication about the balanced scorecard was accompanied by a cartoon showing Popeye eating spinach, the food which gives him strength, and the caption "are you getting your greens" – a reference to the green zone for the performance targets.

Overall the time and effort expended by Electrical on designing, deploying and supporting the balanced scorecard was significant. Contrasting the approach they adopted with that prescribed in the literature, it is difficult to see what more they could have done. So let us now turn to the question of what was the performance impact?

5. Evaluating the Impact of the Balanced Scorecard

To explore the impact of the balanced scorecard on Electrical two phases of analysis were undertaken. These are presented in the next two sections of the paper. In the first the performance of all of Electrical's branches will be considered, for the time period 2000-

2002. Electrical made branch level data available on monthly sales and gross profit for the period 2000-2002. The business formally introduced the balanced scorecard on 1st January 2001, from which time they stopped releasing profit and loss accounts to the branches and linked the bonus scheme to the balanced scorecard. Following an internal reorganization, Electrical reversed this decision from 1st January 2002, reintroducing profit and loss reporting at the branch level.

To supplement the financial data this research draws on two other qualitative data sources. These data, which were gathered via participant observation during the design and deployment phase of the balanced scorecard project and through a series of semi-structured interviews conducted six to nine months after the balanced scorecard had been implemented, will be used to explore some of the findings from the quantitative data.

The firm also made available data on the sales and gross profit performance of the Sister company's branches. These data are used in a quasi-experimental design. Electrical branches are matched with the geographically nearest Sister branch. The matching process results in 56 matched pairs of branches. Matching branches based on geographical location controls for local economic and labour market activity. Given Electrical and Sister both operate in the same industry [indeed they had been direct competitors prior to the take-over of Electrical by Sister] the matching process also controls for industry effects. Unfortunately, for reasons of commercial sensitivity, Sister was only willing to make monthly branch level sales and gross profit data available to the research team for 2000 and 2001 [not 2002]. However this still enabled the research team to explore the relative changes in performance between Electrical and Sister during the period when the balanced scorecard was introduced.

The Impact of the Balanced Scorecard in Electrical

As mentioned in the previous section, Electrical provided monthly branch level figures for sales and gross profit for 122 branches for the calendar years 2000-2002. 32 branches opened or closed during the period of study and some data were unavailable for a further 3 of them, leaving an effective sample of 87 branches. Between them, these 87 branches achieved sales of just over £160 million/year during the period of the study. Figure 2 shows how Electrical's sales and gross profit changed over the period under study. As can be seen from the data there is some seasonality in the business, with sales and gross profit dipping in December.

Figure 2: Electrical's Normalised Monthly Financial Performance

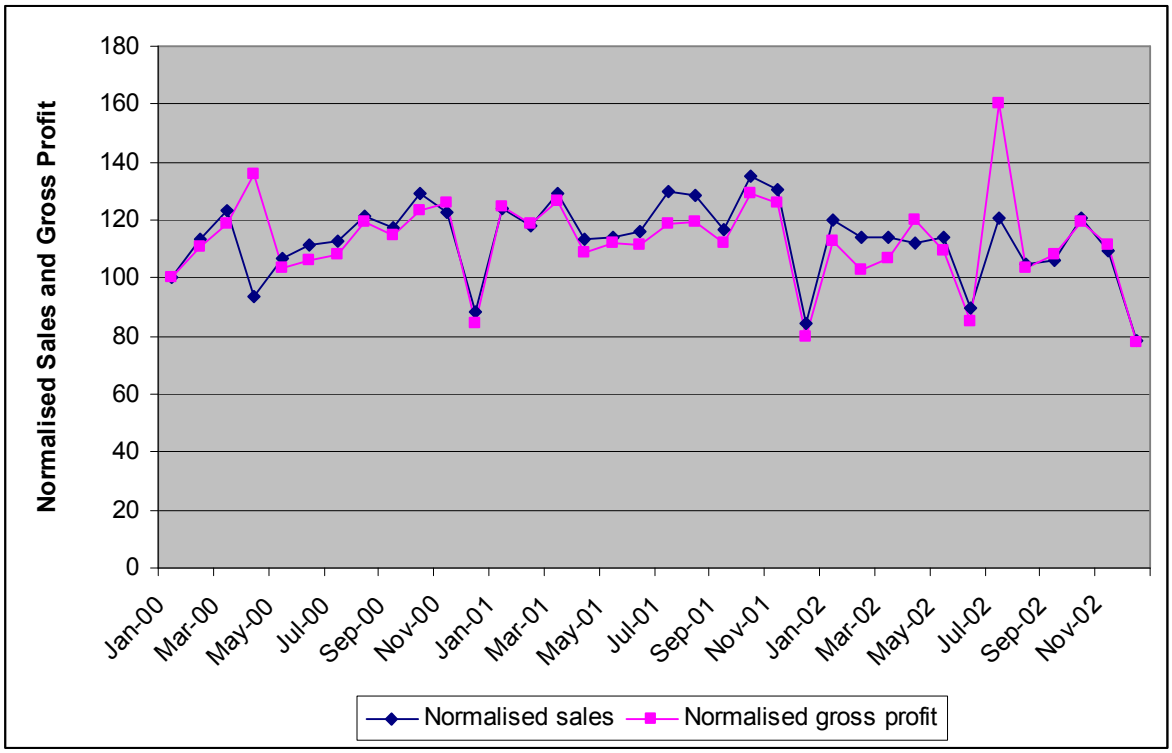


Table 1 summarises these data and compares sales and gross profit in 2000 with 2001 and 2002. These data suggest that while sales were higher in 2001 (during the period when the balanced scorecard was operating), sales dropped back in 2002 (once the company had reverted to traditional profit and loss reporting).

Table 1: Summary Performance Data for Electrical

	2000	2001	2002
Total Sales	100%	103.34%	91.83%
Gross Profit	100%	97.75%	92.28%

To explore these findings in more detail the research team conducted paired sample t-tests comparing the sample means. As mentioned previously, the data in Figure 2 suggest some seasonality, certainly in terms of sales, so the decision was taken to compare sales in January 2000 with sales in January 2001 and to compare separately sales in February 2000 with sales in February 2001, etc. The process resulted in 48 paired samples being tested, 24 for each of sales and gross profit. Table 2 shows the results of the 48 tests.

Table 2: Comparison of Monthly Sales and Gross Profit[2]

Variable	Dates	Obs	Mean Difference	Std Err	Std Dev	t	Pr(T>t)
Sales	01/2000-01/2001	87	-24.08	3.77	35.13	-6.39	1.00***
	02/2000-02/2001	87	-4.58	3.18	29.66	-1.44	0.92*
	03/2000-03/2001	87	-5.58	4.44	41.37	-1.26	0.89
	04/2000-04/2001	87	-19.39	4.43	41.31	-4.38	1.00***
	05/2000-05/2001	87	-6.67	4.25	39.67	-1.57	0.94*
	06/2000-06/2001	87	-4.87	4.00	37.27	-1.22	0.89
	07/2000-07/2001	87	-16.77	4.47	41.67	-3.75	1.00***
	08/2000-08/2001	87	-7.09	4.90	45.68	-1.45	0.92*
	09/2000-09/2001	87	0.76	3.98	37.13	0.19	0.42
	10/2000-10/2001	87	-5.51	4.21	39.26	-1.31	0.90*
	11/2000-11/2001	87	-7.95	3.25	30.36	-2.44	0.99***
	12/2000-12/2001	87	4.11	2.18	20.30	1.89	0.03++
	01/2001-01/2002	87	4.37	3.02	28.12	1.45	0.08*
	02/2001-02/2002	87	4.31	3.09	28.78	1.40	0.08*
	03/2001-03/2002	87	15.07	3.65	34.05	4.13	0.00***
	04/2001-04/2002	87	0.91	3.76	35.11	0.24	0.40
	05/2001-05/2002	87	-0.36	3.48	32.49	-0.10	0.54
	06/2001-06/2002	87	26.54	3.28	30.59	8.09	0.00***
	07/2001-07/2002	87	9.30	4.91	45.77	1.89	0.03**
	08/2001-08/2002	87	23.78	6.26	58.35	3.80	0.00***
	09/2001-09/2002	87	10.52	5.18	48.29	2.03	0.02**
	10/2001-10/2002	87	14.19	6.90	64.40	2.05	0.02**
	11/2001-11/2002	87	20.81	6.06	56.52	3.43	0.00***
	12/2001-12/2002	87	5.87	4.11	38.30	1.43	0.08*
Gross Profit	01/2000-01/2001	87	-24.56	4.11	38.33	-5.98	1.00***
	02/2000-02/2001	87	-7.89	3.16	29.47	-2.50	0.99***
	03/2000-03/2001	87	-7.95	3.99	37.24	-1.99	0.98**
	04/2000-04/2001	87	27.17	7.56	70.52	3.59	0.00+++
	05/2000-05/2001	87	-8.15	4.14	38.58	-1.97	0.97**
	06/2000-06/2001	87	-5.57	3.78	35.27	-1.47	0.93*
	07/2000-07/2001	87	-10.45	4.22	39.39	-2.47	0.99***
	08/2000-08/2001	87	-0.16	4.06	37.85	-0.04	0.52
	09/2000-09/2001	87	2.81	3.77	35.14	0.75	0.23
	10/2000-10/2001	87	-6.26	3.90	36.38	-1.61	0.94*

[2] *** = significant at 1% and consistent with the hypothesis that the balanced scorecard has a positive impact; ** = significant at 5% and consistent with the hypothesis that the balanced scorecard has a positive impact; * = significant at 10% and consistent with the hypothesis that the balanced scorecard has a positive impact; +++ = significant at 1% and inconsistent with the hypothesis that the balanced scorecard has a positive impact; ++ = significant at 5% and inconsistent with the hypothesis that the balanced scorecard has a positive impact; + = significant at 10% and inconsistent with the hypothesis that the balanced scorecard has a positive impact.

Variable	Dates	Obs	Mean Difference	Std Err	Std Dev	t	Pr(T>t)
	11/2000-11/2001	87	-0.25	3.38	31.54	-0.08	0.53
	12/2000-12/2001	87	4.22	2.84	26.45	1.49	0.07^{+}
	01/2001-01/2002	87	11.70	3.04	28.36	3.85	0.00***
	02/2001-02/2002	87	15.72	2.57	23.94	6.12	0.00***
	03/2001-03/2002	87	19.76	3.16	29.52	6.24	0.00***
	04/2001-04/2002	87	-11.28	2.95	27.51	-3.82	1.00^{+++}
	05/2001-05/2002	87	2.34	2.85	26.55	0.82	0.21
	06/2001-06/2002	87	26.23	3.23	30.12	8.12	0.00***
	07/2001-07/2002	87	-41.33	6.43	59.96	-6.43	1.00^{+++}
	08/2001-08/2002	87	15.81	7.07	65.97	2.24	0.01***
	09/2001-09/2002	87	3.54	5.65	52.67	0.63	0.27
	10/2001-10/2002	87	9.84	6.29	58.70	1.56	0.06*
	11/2001-11/2002	87	14.81	5.48	51.11	2.70	0.00***
	12/2001-12/2002	87	2.25	3.67	34.27	0.61	0.27

Of the 48 tests, 37 provided a statistically significant result (see Table 2). 31 of these were consistent with the hypothesis that the balanced scorecard made a positive difference, while six were inconsistent with this assertion. Nineteen of the statistically significant results related to sales, eighteen of which supported the hypothesis that the balanced scorecard made a positive difference. Of these nineteen statistically significant results, nine supported the hypothesis that there was a statistically significant increase in sales after the introduction of the balanced scorecard, while eight supported the hypothesis that there was a statistically significant reduction in sales after the removal of the balanced scorecard. In terms of changes in gross profit there were eighteen statistically significant results, fourteen of which supported the hypothesis that the balanced scorecard made a positive difference. Seven results showed that there was a statistically significant increase in gross profit after the balanced scorecard was introduced, while a further seven showed that there was a statistically significant decrease in gross profit after the removal of the balanced scorecard.

On the surface, these data appear to suggest that introduction of the balanced scorecard has had a positive impact in terms of both sales and gross profit and its removal has had a negative impact on both of these variables. Clearly there are questions of what else was happening in the business at the same time, especially given the fact that Electrical was taken over during the third quarter of 2000, during the deployment of the balanced scorecard. It could therefore be argued that many members of the organization would have been distracted and concerned about the implications of the takeover and therefore it would not be surprising to see performance deteriorate during the last quarter of 2000 and the early part of 2001. Indeed it was clear to the author of this paper who was working with the company at the time that many people were distracted, but it is important to understand

the magnitude of the change that the organization felt it was undertaking by implementing the balanced scorecard. The Chief Executive frequently described the implementation of the balanced scorecard as the biggest change that the business had made in a decade and it had clearly captured the attention of many of the business' most senior managers. Indeed, in the 3rd quarter of 2000 the board of Electrical declared that they were willing collectively to resign if their new parent company blocked the implementation of the balanced scorecard[3]. The point is that while other events were clearly occurring in the organization at the time of the study one of the most significant was widely perceived to be the implementation of the balanced scorecard and associated incentive scheme.

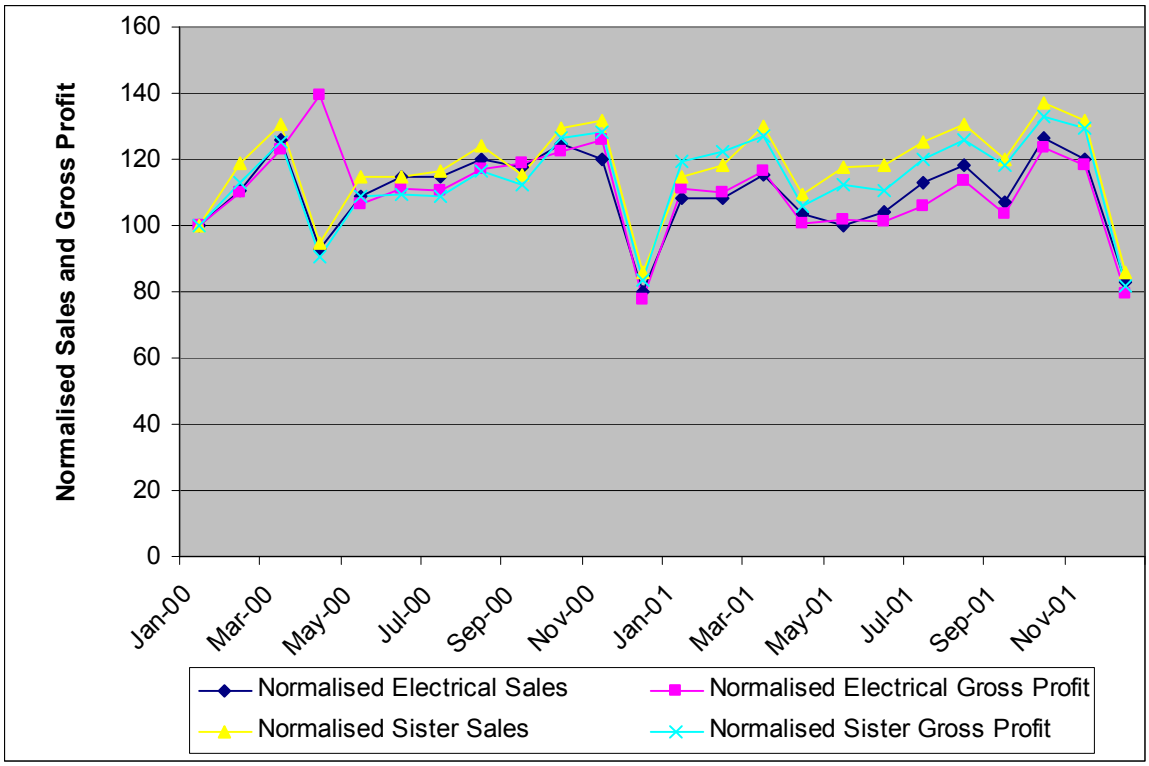
Contrasting Electrical with Sister

As already discussed, in addition to the sales and gross profit data made available by Electrical the company that acquired Electrical owned another wholesaler of Electrical components in the UK – called Sister for the purposes of this paper. Sister provided monthly data on sales and gross profit for some 192 branches for 2000 and 2001. This data set was combined with the data provided by Electrical and 56 matched pairs of branches (branches based in the same town/city) were identified. This process allowed the research team to control for local economic conditions, product range and customer base, as Electrical and Sister branches tended to stock a similar range of products and deal with a similar range of customers. The data was normalized with the values for January 2000 in each case being set to 100. Figure 3 summarises the average growth in sales and gross profit performance for these matched sets of branches during 2000 and 2001 using these data.

To explore these findings in more detail paired sample t-tests were conducted comparing the sample means. Again, to take account of seasonality growth in both sales and gross profit was compared on a year by year basis. Sales and gross profit growth were calculated for both Electrical and Sister separately and then the rates of growth compared. Table 3 shows the results of these analyses.

[3] Discussion between the board of Electrical and the Chairman and Finance Director of the company that acquired them in Sept., 2000.

Figure 3: Comparing Electrical and Sister's Performance



As Table 3 shows there is no statistically significant difference between the growth in sales and the gross in growth profits between the Electrical and Sister branches, suggesting that the earlier observed differences are more likely due to external factors [i.e. those affecting all branches] rather than internal factors [e.g. management changes such as the introduction of the balanced scorecard]. Given the balanced scorecard is designed to have an impact on branch performance this is a surprising finding, but there are of course differences in the rate of adoption of the balanced scorecard in different branches.

Table 3: Comparison of Monthly Sales and Gross Profit for Matched Branches[4]

Variable	Dates	Obs	Mean Difference	Std Err	Std Dev	t	Pr(T>t)
Sales	01/2000-01/2001	56	-0.250	7.296	54.599	-0.034	0.514
	02/2000-02/2001	56	-0.907	7.384	55.258	-0.123	0.549
	03/2000-03/2001	56	-1.511	9.216	68.967	-0.164	0.565
	04/2000-04/2001	56	0.600	6.015	45.013	0.100	0.460
	05/2000-05/2001	56	-0.220	7.173	53.675	-0.031	0.512
	06/2000-06/2001	56	-0.698	6.993	52.334	-0.100	0.540
	07/2000-07/2001	56	-0.968	7.565	56.614	-0.128	0.551
	08/2000-08/2001	56	-0.449	7.116	53.254	-0.063	0.525
	09/2000-09/2001	56	-0.097	8.006	59.915	-0.012	0.505
	10/2000-10/2001	56	0.758	7.094	53.089	0.107	0.458
	11/2000-11/2001	56	1.045	8.623	64.532	0.121	0.452
	12/2000-12/2001	56	0.915	5.600	41.905	0.163	0.435
Gross Profit	01/2000-01/2001	56	0.281	7.689	57.540	0.037	0.486
	02/2000-02/2001	56	-0.846	6.660	49.836	-0.127	0.550
	03/2000-03/2001	56	-1.847	7.790	58.294	-0.237	0.593
	04/2000-04/2001	56	0.357	16.875	126.282	0.021	0.492
	05/2000-05/2001	56	-0.059	6.645	49.728	-0.009	0.504
	06/2000-06/2001	56	-0.534	6.761	50.594	-0.079	0.531
	07/2000-07/2001	56	-0.770	6.879	51.480	-0.112	0.544
	08/2000-08/2001	56	-0.412	7.751	58.005	-0.053	0.521
	09/2000-09/2001	56	0.036	8.666	64.849	0.004	0.498
	10/2000-10/2001	56	1.472	7.618	57.010	0.193	0.424
	11/2000-11/2001	56	1.061	8.992	67.290	0.118	0.453
	12/2000-12/2001	56	1.200	4.919	36.812	0.244	0.404

One of the other variables that the organisation made available to the researcher was number of non-financial balanced scorecard points earned. This score was calculated by awarding "points" for every green [above target performance]. At June 2001 the range of points earned ran from a minimum of 4 points to a maximum of 67, with a mean of 24.22 points [n=50, as data on the number of non-financial balanced scorecard points earned were not available for six of the matched pairs of branches]. These data suggest that some branches took the balanced scorecard more seriously than others – or at least managed to perform better against it than other branches. So the analysis was re-run in two separate sets. First the analysis was re-run only for those branches scoring more than 24.22 points [i.e. the branches that were performing well on the balanced scorecard]. Second the analysis was re-run for those branches with less than 24.22 points [i.e. the branches that

[4] *** = significant at 1% and consistent with the hypothesis that the balanced scorecard has a positive impact; ** = significant at 5% and consistent with the hypothesis that the balanced scorecard has a positive impact; * = significant at 10% and consistent with the hypothesis that the balanced scorecard has a positive impact; $^{+++}$ = significant at 1% and inconsistent with the hypothesis that the balanced scorecard has a positive impact; $^{++}$ = significant at 5% and inconsistent with the hypothesis that the balanced scorecard has a positive impact; $^{+}$ = significant at 10% and inconsistent with the hypothesis that the balanced scorecard has a positive impact.

were performing badly on the balanced scorecard]. Tables 4 and 5 summarise the results of these analyses.

Table 4: Comparison of Monthly Sales and Gross Profit for Matched Branches [Branches that Score Well on the Non-Financial Measures] [5]

Variable	Dates	Obs	Mean Difference	Std Err	Std Dev	t	Pr(T>t)
Sales	01/2000-01/2001	25	-7.220	10.262	51.308	-0.704	0.756
	02/2000-02/2001	25	-7.240	11.247	56.236	-0.644	0.737
	03/2000-03/2001	25	-13.319	14.833	74.165	-0.898	0.811
	04/2000-04/2001	25	-3.731	10.059	50.293	-0.371	0.643
	05/2000-05/2001	25	-2.926	11.220	56.100	-0.261	0.602
	06/2000-06/2001	25	1.162	9.324	46.620	0.125	0.451
	07/2000-07/2001	25	-0.090	9.686	48.432	-0.009	0.504
	08/2000-08/2001	25	-10.468	11.032	55.162	-0.949	0.824
	09/2000-09/2001	25	-9.943	12.536	62.680	-0.793	0.782
	10/2000-10/2001	25	-8.344	11.816	59.081	-0.706	0.757
	11/2000-11/2001	25	-13.048	16.239	81.193	-0.804	0.785
	12/2000-12/2001	25	-11.730	10.091	50.454	-1.162	0.872
Gross Profit	01/2000-01/2001	25	-7.942	10.460	52.300	-0.759	0.773
	02/2000-02/2001	25	-10.643	10.286	51.429	-1.035	0.844
	03/2000-03/2001	25	-8.117	14.100	70.502	-0.576	0.715
	04/2000-04/2001	25	-25.935	28.831	144.155	-0.900	0.811
	05/2000-05/2001	25	-4.035	10.614	53.071	-0.380	0.646
	06/2000-06/2001	25	4.353	10.228	51.139	0.426	0.337
	07/2000-07/2001	25	-2.062	11.034	55.169	-0.187	0.573
	08/2000-08/2001	25	-15.285	11.429	57.143	-1.337	0.903**
	09/2000-09/2001	25	-12.183	12.049	60.246	-1.011	0.839
	10/2000-10/2001	25	-11.892	11.557	57.787	-1.029	0.843
	11/2000-11/2001	25	-13.486	15.430	77.151	-0.874	0.805
	12/2000-12/2001	25	-8.811	8.211	41.053	-1.073	0.853

[5] *** = significant at 1% and consistent with the hypothesis that the balanced scorecard has a positive impact; ** = significant at 5% and consistent with the hypothesis that the balanced scorecard has a positive impact; * = significant at 10% and consistent with the hypothesis that the balanced scorecard has a positive impact; $^{+++}$ = significant at 1% and inconsistent with the hypothesis that the balanced scorecard has a positive impact; $^{++}$ = significant at 5% and inconsistent with the hypothesis that the balanced scorecard has a positive impact; $^{+}$ = significant at 10% and inconsistent with the hypothesis that the balanced scorecard has a positive impact.

Table 5: Comparison of Monthly Sales and Gross Profit for Matched Branches [Branches that Score Badly on the Non-Financial Measures] [6]

Variable	Dates	Obs	Mean Difference	Std Err	Std Dev	t	Pr(T>t)
Sales	01/2000-01/2001	25	8.034	12.582	62.911	0.639	0.265
	02/2000-02/2001	25	2.489	11.901	59.503	0.209	0.418
	03/2000-03/2001	25	15.805	13.484	67.419	1.172	0.126
	04/2000-04/2001	25	5.142	8.752	43.759	0.588	0.281
	05/2000-05/2001	25	4.448	10.478	52.391	0.425	0.338
	06/2000-06/2001	25	5.503	11.538	57.692	0.477	0.319
	07/2000-07/2001	25	10.669	12.476	62.382	0.855	0.201
	08/2000-08/2001	25	17.151	10.204	51.022	1.681	0.053^{+}
	09/2000-09/2001	25	13.059	12.465	62.324	1.048	0.153
	10/2000-10/2001	25	11.378	9.933	49.667	1.145	0.132
	11/2000-11/2001	25	21.221	8.887	44.434	2.388	0.013^{++}
	12/2000-12/2001	25	15.002	5.757	28.783	2.606	0.008^{+++}
Gross Profit	01/2000-01/2001	25	9.670	13.036	65.181	0.742	0.233
	02/2000-02/2001	25	3.424	9.461	47.303	0.362	0.360
	03/2000-03/2001	25	8.393	8.993	44.967	0.933	0.180
	04/2000-04/2001	25	18.141	22.052	110.259	0.823	0.209
	05/2000-05/2001	25	5.267	9.329	46.644	0.565	0.289
	06/2000-06/2001	25	-0.752	10.076	50.380	-0.075	0.529
	07/2000-07/2001	25	10.669	12.476	62.382	0.855	0.201
	08/2000-08/2001	25	19.416	11.930	59.652	1.628	0.058^{+}
	09/2000-09/2001	25	12.054	14.689	73.445	0.821	0.210
	10/2000-10/2001	25	16.542	11.516	57.578	1.437	0.082^{+}
	11/2000-11/2001	25	21.399	11.571	57.857	1.849	0.038^{++}
	12/2000-12/2001	25	15.002	5.757	28.783	2.606	0.008^{+++}

Of the 24 tests presented in Tables 4 and 5, eight results are statistically significant. One suggests that the balanced scorecard has a positive impact on gross profit for those branches that perform well in terms of the non-financial measures (see Table 4). The other seven results suggest that the balanced scorecard has a negative impact on sales (three results) and gross profit (four results), when branches perform badly on the non-financial measures. That is when branches perform badly on the non-financial measures they also see lower sales and gross profits than their matched comparator branches. Two possible explanations for this immediately spring to mind. It may be that branches that perform badly on the non-financial measures are simply badly run branches – i.e. they don't

[6] *** = significant at 1% and consistent with the hypothesis that the balanced scorecard has a positive impact; ** = significant at 5% and consistent with the hypothesis that the balanced scorecard has a positive impact; * = significant at 10% and consistent with the hypothesis that the balanced scorecard has a positive impact; $^{+++}$ = significant at 1% and inconsistent with the hypothesis that the balanced scorecard has a positive impact; $^{++}$ = significant at 5% and inconsistent with the hypothesis that the balanced scorecard has a positive impact; $^{+}$ = significant at 10% and inconsistent with the hypothesis that the balanced scorecard has a positive impact.

perform well on anything, hence it is no surprise that they perform badly on sales and gross profits as well as the non-financial measures. Alternatively, it may be that the staff and managers in these branches have spread their attention too thinly – i.e. by trying to manage multiple dimensions of performance simultaneously (as Michael Jensen would argue) they have lost their focus on the dimensions of performance that matter.

6. Discussion and Implications

What can be concluded overall from the data? The first point to note is that while, at first sight, the data appear to suggest that the implementation of the balanced scorecard had a positive impact on Electrical's performance [in terms of sales and gross profit], further investigation reveals that this is not the case. Indeed the introduction of the control group through the quasi-experiment raises some significant questions about the performance impact of the balanced scorecard. At the aggregate level, it appears that the introduction of the balanced scorecard has had no significant impact on branch performance in terms of either sales or gross profit. And when the sample is split based success on non-financial measures, a case could be made that the balanced scorecard has actually had a detrimental effect (see Table 5) as those that branches that score well on non-financial measures generally do not outperform their comparator branches on the financial measures, while those branches that score poorly on the non-financial measures also score poorly on the financial measures. Perhaps the agency theorists are correct when they argue that multi-dimensional measurement systems are simply confusing and lead to a dispersion of effort.

How else might these findings be explained – beyond the simple assertion that the balanced scorecard does not work. The first possibility is a question of timescale. The data reported in this study cover a three-year period, but the balanced scorecard was only in operation for a twelve month period in one division. Anecdotal evidence suggests that behaviours in the organisation changed following the introduction of the balanced scorecard. For example, several of the Directors of the firm recounted caselets illustrating how behaviours had changed during a series of interviews with one of the author's colleagues. The Human Resources director, for example, reported that one of the most fiercely competitive regional managers had started passing orders to colleagues in other regions after the introduction of the balanced scorecard. While these behavioural changes may be desirable we know that changes in non-financial dimensions of performance do not immediately impact financial performance, but instead take time to flow through the system (Ferdows and De Meyer, 1990). Perhaps the balanced scorecard was simply not left in place long enough to enable these changes to flow through and impact financial performance.

An alternative explanation, and one that certainly merits further investigation, is the question of what action managers could take based on the data. The performance measurement system, per se, will have little impact on the organisation's performance, unless people take action and change things on the basis of the reported performance data. Electrical spent a significant amount of time designing and deploying their balanced scorecard, but paid relatively limited attention to the accompanying improvement process. How could managers use the measurement data they were presented with to improve organisational performance? Many of the measures were presented in a rather aggregated form. One of the measures, for example, customer retention, reported the % of retained customers, but how could managers act on this? All the managers received was a bland figure stating that they had retained 74% of their customers. To act the branch managers needed to know, by name, which customers they had retained and which they had lost. They needed the contact details of the customers involved so they could make contact with them and try to persuade them to come back to the business. Without this disaggregated information the bland figure is somewhat worthless.

So what does this research mean for practitioners and researchers? First the study highlights the fact that further research is required into the performance impact of balanced scorecards and the timescale over which this performance impact can be observed. Certainly the data presented in this study suggest that the balanced scorecard implemented in Electrical had no significant impact in terms of sales growth or gross profit growth over a twelve month period. It may be that the balanced scorecard would have had a performance impact had it been retained for a longer period and the author is currently in negotiation with another organization to access data that will allow them to test this claim. Similarly, if the findings of this study are replicated in other similar naturally occurring experiments, then work is required to understand why balanced scorecards do not have the impact one would expect. Intuitively people accept that organizations need to keep track of their performance so that they can identify how well they are doing and what they need to improve. Well-designed balanced scorecards provide access to such measures and so if correctly implemented one would assume that they should enable performance improvement. Yet in the case of Electrical performance improvement does not appear to have materialised. Why is this the case? Is it due to the fact that the organization did not give the balanced scorecard long enough to work? Is it that the organization did not supplement the balanced scorecard with an appropriate improvement methodology and/or programme? Is it that the balanced scorecard suffers from the same criticisms that can be made of many measurement systems – too much data arriving too late for managers to act on them? These issues need to be explored and understood much more fully so that we can advise practitioners not simply on how better to measure, but on how better to perform.

References

Bourne, M., Mills, J., Wilcox, M., Neely, A. and Platts, K. (2000) Designing, Implementing and Updating Performance Measurement Systems. *International Journal of Operations & Production Management* 20, 754-771.

Chenhall, R.H. (2005) Integrative Strategic Performance Measurement Systems, Strategic Alignment of Manufacturing, Learning and Strategic Outcomes: An Exploratory Study. *Accounting Organizations and Society* 30, 395-422.

Cook, T.D. and Campbell, D.T. (1979) New York: Houghton Mifflin.

Davis, S. and Albright, T. (2004) An investigation of the effect of Balanced Scorecard implementation on financial performance. *Management Accounting Research* 15, 135-153.

de Waal, A.A. (2003) Behavioral Factors Important for the Successful Implementation and Use of Performance Management Systems. *Management Decisions* 41, 688-697.

Dumond, E.J. (1994) Making Best Use of Performance-Measures and Information. *International Journal of Operations & Production Management* 14, 16-31.

Ferdows, K. and De Meyer, A. (1990) Lasting improvements in manufacturing performance: In search of a new theory. *Journal of Operations Management* 9 (2):168-184.

Forza, C. and Salvador, F. (2000) Assessing Some Distinctive Dimensions of Performance Feedback Information in High Performing Plants. *International Journal of Operations & Production Management* 20, 359-385.

Forza, C. and Salvador, F. (2001) Information Flows for High-Performance Manufacturing. *International Journal of Production Economics* 70, 21-36.

Franco-Santos, M., Kennerley, M., Micheli, P., Martinez, V., Mason, S., Marr, B., Gray, D. and Neely, A. (2007) Towards a Definition of a Business Performance Measurement System. *International Journal of Operations and Production Management,* forthcoming.

Frigo, M.L. (2000) 2000 CMG Survey on Performance Measurement: The Evolution of Performance Measurement Systems. *Cost Management Update* 105, 1-3.

Frigo, M.L. and Krumwiede, K.R. (1999) Balanced Scorecards: A Rising Trend in Strategic Performance Measurement. *Journal of Strategic Performance Measurement* 3, 42-48.

Gates, S. (1999) Aligning Strategic Performance Measures and Results. New York: The Conference Board.

Hayes, R.H. and Abernathy, W.J. (1980) Managing Our Way to Economic Decline. *Harvard Business Review* 67-77.

Ittner, C.D. and Larcker, D.F. (2003) Coming up Short on Nonfinancial Performance Measurement. *Harvard Business Review* 81, 88-95.

Ittner, C.D., Larcker, D.F. and Meyer, M.W. (2003a) Subjectivity and the Weighting of Performance Measures: Evidence From a Balanced Scorecard. *Accounting Review* 78, 725-758.

Ittner, C.D., Larcker, D.F. and Randall, T. (2003b) Performance Implications of Strategic Performance Measurement in Financial Services Firms. *Accounting Organizations and Society* 28, 715-741.

Johnson, H.T. and Kaplan, R.S. (1988) *Relevance Lost - The Rise and Fall of Management Accounting*, Boston, MA: Harvard Business School Press.

Kaplan, R.S. and Norton, D.P. (1992) The Balanced Scorecard - Measures That Drive Performance. *Harvard Business Review* 70, 71-79.

Kaplan, R.S. and Norton, D.P. (2000) Having Trouble with your Strategy? Then Map It. *Harvard Business Review* 167-176.

Kaplan, R.S. and Norton, D.P. (2001) *The Strategy-Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment*, Boston, MA.: Harvard Business School Press.

Ketelhohn, W. (1998) What is a Key Success Factor? *European Management Journal* 16, 335-340.

Lawson, R., Stratton, W. and Hatch, T. (2003) The Benefits of a Scorecard System. *CMA Management* 24-26.

Lingle, J.H. and Schiemann, W.A. (1996) From Balanced Scorecard to Strategy Gauges: Is Measurement Worth It? *Management Review* 56-62.

Malina, M.A. and Selto, F.H. (2001) Communicating and controlling strategy: An empirical study of the effectiveness of the balanced scorecard. *Journal of Management Accounting Research* 13 47-90. 10492127.

Marr, B. and Neely, A.D. (2003) *Balanced Scorecard Software Report*, edn. Stamford, CT: Gartner.

Melnyk, S.A., Stewart, D.M. and Swink, M. (2004) Metrics and Performance Measurement in Operations Management: Dealing With the Metrics Maze. *Journal of Operations Management* 22, 209-217.

Neely, A. (1999) The Performance Measurement Revolution: Why Now and What Next? *International Journal of Operations & Production Management* 19, 205-228.

Neely, A., Gregory, M. and Platts, K. (1995) Performance Measurement System Design - A Literature Review and Research Agenda. *International Journal of Operations & Production Management* 15, 80-116.

Neely, A., Mills, J., Platts, K., Richards, H., Gregory, M., Bourne, M. and Kennerley, M. (2000) Performance Measurement System Design: Developing and Testing a Process-Based Approach. *International Journal of Operations & Production Management* 20, 1119-1145.

Neely, A., Richards, H., Mills, J., Platts, K. and Bourne, M. (1997) Designing Performance Measures: A Structured Approach. *International Journal of Operations & Production Management* 17, 1131-1153.

Neely, A.D., Adams, C.A. and Kennerley, M. (2002a) *The Performance Prism: The Scorecard for Measuring and Managing Stakeholder Success*, edn. London: Financial Times/Prentice Hall.

Neely, A.D., Bourne, M.C.S., Mills, J.F., Platts, K.W. and Richards, A.H.2. (2002b) Getting the Measure of your Business. Cambridge: Cambridge University Press.

Neely, A.D., Kennerley, M. and Walters, A., (Eds.) Business Performance Measurement What is the State of the Art in Large US Firms? edn. Edinburgh, Scotland: (2004)

Norreklit, H. (2000) The Balance on the Balanced Scorecard: A Critical Analysis of Some of Its Assumptions. *Management Accounting Research* 11, 65-88.

Norreklit, H. (2003) The Balanced Scorecard: What Is the Score? A Rhetorical Analysis of the Balanced Scorecard. *Accounting, Organisations and Society* 28, 591-619.

Ridgway, V.F. (1956) Dysfunctional Consequences of Performance Measurements. *Administrative Science Quarterly* 241-247.

Rigby, D. (2001) Management Tools and Techniques: A Survey. *California Management Review* 43, 139-160.

Rigby, D. (2005) Management Tools 2005. Bain & Co.

Sandt, J., Schaeffer, U. and Weber, J. (2001) Balanced Performance Measurement Systems and Manager Satisfaction - Empirical Evidence from a German Study. WHU - Otto Beisheim Graduate School of Management.

Silk, S. (1998) Automating the Balanced Scorecard. *Management Accounting* 79, 38-44.

Speckbacher, G., Bischof, J. and Pfeiffer, T. (2003) A Descriptive Analysis on the Implementation of Balanced Scorecards in German-Speaking Countries. *Management Accounting Research* 14, 361-387.

Vasconcellos, J. (1988) The Impact of Key Success Factors on Company Performance. *Long Range Planning* 21, 56-64.