Searching for e-Business Performance Measurement Systems

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Abstract: Organisations of all kinds continue to expand their involvement in e-business. This requires considerable financial investment in IT, in processes and in people. It might be expected that there would be a concern to ensure that performance measurement systems are capable of justifying these investments, and of evaluating their worth once implemented. The paper describes research aimed at determining the exact nature of such e-business performance measurement systems and the benefits that accrue from their use. The research uses a case study methodology to report the performance measurement practices of twelve potentially exemplar organisations that have made efforts to develop distinctive performance metrics for e-business. Qualitative data was collected from interviews with key informants from each organisation. Additional data came from company documents. The cases reveal a variety of approaches to e-business performance measurement, with no common framework apparent. Whilst there is considerable disparity in the level of success achieved in developing suitable measures, there is evidence of a common concern to link e-business performance to organisational objectives. However, there is a general reluctance to embark on major overhauls of existing performance measurement systems. The paper discusses the possible reasons for this and the implications for future developments in e-business performance measurement practices.

Keywords: e-business, performance measurement systems, IT evaluation

1. Introduction

Electronic business (E-business) is the use of Internet-based information and communication technologies (ICTs) to conduct business (including sharing information, maintaining relationships and conducting transactions) within and between organisations (Poon and Swatman, 1999). Over the last decade organisations of all kinds have rushed to join the online e-business community. By 2005 e-business was commonplace in British business practice. According to the European Commission, British use of the Internet in business was the highest in Europe with over 98% of British firms having some kind of online presence and e-business accounted for 14% of business turnover (E-business watch, 2005).

In order to participate in the new online business environment, businesses have had to make significant financial investments, not only in the necessary technologies but also in the processes and people necessary to operate them. Whether evaluating e-business investment proposals or monitoring the resulting online business operations requires the existence of an appropriate performance measurement system. It might have been expected that there would have been a widespread concern about whether these investments have yielded the expected improvements in performance. Associated with this, one might also have expected some kind of debate about the adequacy of existing performance measurement systems for the online environment. As Straub et al. (2002: 117) argue, "The unique characteristics underlying the Web may in some cases require new metrics or at least the careful evaluation of existing ones to facilitate the development of innovative solutions to emerging problems". It is therefore surprising to discover a relative dearth of academic literature in the field. Marr and Neely's (2001) study of performance measurement practices in e-businesses remains a rare example of empirical research. Their study paints a picture of e-businesses measuring many different dimensions of performance. Yet, they report near universal dissatisfaction with existing measurement systems. This leads the authors to "question the appropriateness of existing performance measurement systems in today's (digital) economy" (Marr and Neely, 2001: 214). Whilst many e-business researchers have argued that new kinds of performance measurement are needed for e-businesses (e.g. Tonchia, 2002), it is far from clear how, or even if, existing models of performance measurement need to be modified to make them suitable for the online environment. Nor is there any consensus amongst practitioners as to which measures are effective for measuring e-business performance (Hinton and Barnes, 2005a).

There is an evident need to identify the features of an effective e-business performance measurement system. This report describes research that aims to do this. The approach it follows is to study the performance measurement practices of exemplar organisations that seem to have had some success in developing

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performance measurement systems suitable for the online environment.

2. Literature review

Recent years have seen something of a revolution in performance measurement with the development of "balanced" or "multi-dimensional" performance measurement frameworks. Of these new frameworks, the Balanced Scorecard (BSC) has become pre-eminent (Kaplan and Norton, 1992). Marr and Schiuma (2003: 680) claim that the BSC is "the most influential and dominant concept in the field" is given weight by Neely's (2005) review of recent performance measurement research. He notes its impact on practice, citing research showing that anything between 30 and 60 per cent of firms have adopted the BSC in some form, and on academic research, in which Kaplan and Norton's writings on the BSC have dominated the citations in articles on performance measurement. The BSC was first presented as a tool for organising performance measures into four key perspectives (financial, customer, internal process, innovation). Since then, it has grown into a device for controlling the implementation of strategy by linking the performance measures to organisational strategy and goals (Kaplan and Norton, 2000). It might be expected that performance measurement systems used in leading e-businesses would also be based on the BSC. As a minimum it might be expected that an e-business performance measurement system would be based on a range of measures, other than the usual financial ones, and would seek to link e-business decisions and actions to organisational objectives and strategy.

There are some criticisms of the rush to adopt the BSC and of the increased attention to performance measurement more generally. These centre on the costs associated with measuring what can often amount to literally hundreds of things at any one time. As Neely and Austin (2000) note, "a measurement crisis is looming - measurement madness… the problem is that society is obsessed with measurement." Neither as Franco and Bourne (2003) argue is there much evidence to support the assertion that the BSC or other performance measurement systems have much of an impact on organisational performance.

Reviewing the wider e-business literature, it is possible to identify a number of factors that an e-business performance measurement system should be concerned with:

- The performance of the website (Zeithaml et al., 2000; Barnes and Vidgen; 2001)
- The performance of business processes (Hinton et al., 2003; Wu et al., 2003)
- The performance of customers (Hinton et al., 2003; Wu et al., 2003; Minocha et al., 2004; Voss, 2003)
- Linking e-business performance to business strategy (Chang et al., 2003; Porter, 2001).

3. Research methodology

The aim of the research was to investigate the performance measurement systems in operation in a number of exemplar organisations that were operating performance measurement systems suitable for e-business. A case study method was deemed the most suitable approach, as it is well suited to investigating contemporary practices within organisations (Yin, 1994). Gathering data of sufficient quality for this study required the identification of appropriate informants within suitable organisations. Previous survey-based research undertaken by the authors had identified a number of individuals who claimed that their organisations were operating e-business performance measurement systems (Hinton and Barnes, 2005b). Nine managers were identified from this group. An additional group of organisations were targeted from amongst the 2005 winners of the UK government's annual national DTI E-Commerce Awards. All winners must demonstrate they have achieved tangible gains by using the Internet or other ICTs and are likely to comprise leading edge practitioners in e-business. A further three companies agreed to participate from this group. The principal method of data collection in the research was via face-to-face, semi-structured interviews with a key informant in each organisation. A framework based on a standard set of question topics was used by the interviewers in order to focus and bound the discussions (Miles and Huberman, 1994). Additional data came from company documents.

4. The case results

The findings from the twelve case organisations are briefly described below. Pseudonyms have been used and some case data disguised to protect confidentiality.

4.1 Lawco

Lawco is a large corporate legal practice employing 3,000 lawyers in more than 20 countries. They operate a number of online services including some that support the work of its own staff; some that offer generic help in particular industries and some that facilitate transactions with individual clients. Lawco aims to

use online working to achieve significant cost and time advantages. They want to use ICT to support their aim of being in the top two providers to each market segments that they serve. The company uses a business case approach to ICT investment appraisal. Lawco has metrics for the technical performance of its websites, including availability and processing times. The company monitors all costs very closely on a daily basis, including the costs associated with its ICT operations. However, the company tries to evaluate performance in ICT against business objectives. This remains a significant challenge due to the many associated intangibility factors.

4.2 Teleco

This case investigated a product development department within one of the world's largest telecommunications companies. The department, whose members operate predominantly in a virtual environment, uses an online workflow management system to monitor progress on its various projects. The system provides a broad range of performance metrics for cost, quality and time. These metrics are linked to the company's strategic aims and objectives through its strategy and vision, which are cascaded down the corporate hierarchy to shape departmental objectives. The main benefits of the online performance measurement system are the speed with which figures are reported and that they are available to everyone on the team via any Internet connection. All departments are required to develop five-year plans, which are linked to specific financial, market and product performance targets. This is, however, problematic in an environment where technology develops very quickly and product lifecycles are typically 18 months to two years.

4.3 Softco

Softco is a provider of specialist customised software, principally to business clients, with offices in Europe, North America and the Far East. Externally, the company's main objectives in its use of e-business are brand building and to strengthen its relationships with its customers. It uses its website for promotional marketing and for after sales support, rather than sales transactions. Internally, it uses e-business technologies to support remote working and promote integration across its various sites. It makes extensive use of the Internet for sales administration, human resource management and for joint working on documents by staff at different locations. Softco does not generally have any separate specific e-business measurements. The company is managed against corporate level financial measures, which are cascaded down to individual departmental metrics, which are also mostly financial. There is no attempt to isolate costs or revenues associated directly with any particular e-business activity. Neither does Softco do detailed financial analysis for ICT investment proposals. But it does monitor operating costs, staff usage and satisfaction levels of particular applications after their introduction to evaluate their success.

4.4 Materialsco

Materialsco is the European division of a large multi-national. The company sells high specification materials to OEMs whose products operate in highly demanding environments. The industry in which Materialsco operates is being driven to use e-business by the OEMs in three ways: electronic bidding for contracts, electronic exchange of documents and production scheduling (including placing, tracking and tracing orders). Materialsco aims to use e-business to improve customer service and reduce staff costs. It does not have separate measures for e-business, treating it as integral to its normal business operations. All capital investment proposals, including ICT, are subject to a rigorous financial appraisal process requiring approval at the corporate headquarters. Internally, each stage of Materialsco's operations performance is measured against a weekly plan, in terms of time, volume and cost. Externally, performance is measured against each customer's requirements for delivery and quality. Additionally, customer satisfaction is measured quarterly through online questionnaires, which record numbers of on-time and late deliveries, concessions or rejections, and paperwork queries, etc. No additional measures have been adopted as a result of moving to e-business.

4.5 Seaside hospital

Seaside Hospital is a large NHS general hospital serving a local population of around 300,000 in England. The hospital has recently introduced e-business technologies into its materials procurement and management systems. The objective is to improve both operating efficiency and service levels. Materials are scanned using barcode technology when it is withdrawn from stock at the point of use within a ward or operating theatre. On withdrawal, the system automatically orders a replacement. The order is then sent to a centralised system, which automatically generates an e-mail acknowledgement. Orders are delivered to the hospital's central store, prior to distribution to local stocking points. More frequent and more reliable deliveries will enable stock levels to be reduced. In recent years, the NHS has been subject to performance monitoring based on a system of government imposed targets. This has

resulted in top-down cost saving targets being imposed throughout the hospital, including materials procurement. Local managers, however, have adopted a bottom-up approach to performance measurement within the materials management. It is not always clear how these are two approaches are linked. The performance of hospital's materials management staff is monitored in terms of the delivery of materials to the wards, including any materials shortages. No attempt seems to have been made to link this performance to patient treatment rates or quality of care.

4.6 Port authority

The Port Authority is a public body charged with the responsibility of managing the navigable waters of one of the UK's largest ports. The Port Authority uses e-business in a number of ways. Firstly, an online system for ships' manifests (i.e. details of their cargoes). This information is provided by shipping lines for use by Customs to authorise offloading, charge duties etc., and by freight forwarders arranging onward handling. This system automates a previous paper-based system, speeding up the process, cutting costs and improving accuracy. Another system operates as a database for ships and shipping movements. The Authority uses this primarily to manage the movement of pilots for ships entering or leaving the port. Additionally the Authority's own website posts important information for all uses of its waters. The site includes an Extranet for key users of the port such as terminal operators, dredging companies, etc. The Port Authority aims to use the technology to improve its efficiency. It has a set of higher-level performance metrics for its operations that link to its mission statement. It is trying to extend these to its use of e-business. The measures developed to date centre around systems availability, number of users and satisfaction with the Authority's services.

4.7 LG union

LG Union is one of the UK's largest trades unions with over one million members, employed mostly in local government. The union has a national website and a linked regional site. The latter operates autonomously, owned and run by the members. Both sites currently have only a low level of interactivity for open access, aimed principally at members. However, the union is currently rolling out support systems for its own employees to facilitate remote working (e.g. for case workers). The union's aims in adopting web-based technology are to provide a better service to the members and operate more efficiently, particularly with regard to peripatetic staff. Corporately, the union's most significant measures of performance are membership growth, its effectiveness in protecting its members and the efficiency of its delivery of services. The union has attempted to utilise the balance scorecard a template for performance measurement. However, it is difficult to link these performance measures with the use of e-business.

4.8 Insureco

Insureco has developed software that enables insurance business to be conducted online. It sells this to insurance companies. The system is essentially an Internet based tool that enables insurance businesses and their channel partners (insurer, broker, agent) to quote, bind and manage insurance products online in real time. The company makes investment decisions using a business case approach, targeting a pay back over two or three years. They evaluate performance of investments post implementation to ensure there is a return. If this is not the case, then efforts are made to enhance the income. Insureco uses very traditional methods to manage performance. Sales targets are the most important measure. Many aspects of internal processes are driven by regulation. However, the driver for the company is keeping costs down. The adoption of e-business helps this. Accordingly, Insureco tries to match performance metrics with its online activities. Online marketing activity is scrutinised and conversion rates of firms signing up for their e-trading platform. Measures used to monitor performance afterwards are very traditional for the insurance industry. Customer quotes are monitored and repeat purchasing and customer retention rates measured. However, the relationship-driven nature of business alleviates the need for direct measurement of customer satisfaction. There are also measures for the technical performance of the website.

4.9 Intergov

Intergov is an inter-governmental organisation funded by 30 countries. It also has relations with some other countries, business and labour organisations and a wide range of non-government organisations. Intergov provides a forum in which governments can work together to address and identifying policy solutions for the challenges of globalisation. Its e-business activities are concerned with information sharing between its own staff and those of its member country governments. It has its own online information system that enables many thousands of officials to access and share a wealth of information on policy and committee work. Use of the Intergov private Internet network enables approved clients to securely access internal

documentation, as well as its publications and statistical products. They can also participate in discussion groups and other online services. Intergov's aim for its use of e-business is to achieve increased member satisfaction and its approach to performance measurement links to this. It relies on the use of surveys with its members to assess its performance.

4.10 Educo

Educo is an online business selling learning support materials, mostly workbooks that comply with the UK's National Curriculum. Its products are bought by schools and parents. Workbooks are purchased online and provided in electronic format, for purchasers to make their own hard copies. Educo's business model relies completely on its use of e-business and it could not be successful without this technology. This also enables Educo to provide ongoing support for its customers. Its website has three distinct areas, each designed for one of its three customer groups: teachers, parents, and children. The aim is to create supportive communities in each area. Educo does not engage in any formal capital investment appraisal. It does have lots of performance measures, particularly those concerned with the customer side of its operations and website performance. Financial measurement concentrates on sales because most costs are fixed. The most important measure used to monitor performance is monthly turnover. The company does not formally monitor cash flow or study the bank accounts, because this is a cash rich business with no debts.

4.11 Wealth bank

Wealth Bank is the subsidiary of a global financial services group. It provides private banking services to wealthy customers through a network of several hundred client advisors. Although it remains a traditional bricks and mortar bank, Wealth Bank has developed two main e-business activities. Firstly, its clients can view their accounts and portfolios online via the bank's website. However at the moment, clients cannot execute their own transactions on the website. Transactions have to be executed by a Wealth Bank client advisor. Secondly, it has established a Wealth Bank product platform "bank-for-banks". This enables financial intermediaries, and other banks, to get access to the full range of Wealth Bank's products and services. The company's motivation for e-business is cost reduction and increasing speed of response. It also aims to improve customer service by providing online access to real-time data for its clients. The bank uses a net present value (NPV) approach to assess its e-business investment proposals. It also uses NPV in post-investment appraisal. Wealth Bank benchmarks against its competitors in measuring the performance of its e-business processes. It measures customer performance in e-business through the quantitative measurement of website clicks. It applies the same measures in e-business as in traditional business, where its measures are underpinned by the Balanced Scorecard.

4.12 Trainingco

Trainingco is a small company that designs bespoke training solutions for corporate clients. They use e-business in two ways. Firstly, they use an online project management software within their own operations, which is especially helpful in the management of their many virtual teams. Secondly, they incorporate e-learning technologies into their training packages for their clients. Trainingco does not have any formal method for appraising capital investments in new technology. Neither does it appear to have any form of performance measurement for its internal operations. Because of its size many aspects of internal performance are evaluated informally. It uses project management software as the basis of its operational management. The extent of the use of this depends on clients. Some are more rigorous in its application than others. They select which tools to use dependent upon the circumstances. Financial performance measures are the most important ones for driving the performance of the business. Costs are constantly reviewed and projections made. Formal financial reviews are conducted monthly for each project. A post-project review is invariably held to determine how they could improve. However, it is very difficult to separate out the e-business component of overall project performance.

5. Cross case analysis

The main findings that emerge from a cross case analysis are:

- The case organisations tend to assess investment proposals for e-business in the same manner as any other capital investment proposal. Large and/or relatively financially sophisticated organisations tend to assess investment proposals for e-business in the same manner as any other capital investment proposal using formal financial methods (e.g. payback, DCF or NPV) to do so. However, evidence from the case of one large and sophisticated organisation (Lawco) demonstrates that it is possible to view e-business differently due to the difficulty of quantifying its intangible benefits.
- Only some of the case organisations had performance metrics in place appropriate to

their expressed aims for their use of e-business. Some had some appropriate e-business metrics, whilst others had none.

- The case organisations appear to have adopted an ad hoc approach to the development of e-business performance metrics. E-business performance metrics included website and technology performance metrics, e-business process metrics and customer metrics.
- All but two of the organisations, measure more than one aspect of performance. However, no organisation had a comprehensive portfolio of e-business performance measurement system. There tended to be a discernable focus to e-business performance measurement (finance, customers or processes).
- Some of the case organisations relied on existing metrics to monitor e-business performance. Some adapted existing metrics. Some introduced completely new e-business performance metrics.
- Whether or not e-business performance metrics are linked to higher level organisational measures seems to depend on whether links already exist within an organisation's performance measurement system.
- There is no evidence to suggest that case organisations have undertaken a reconsideration of the merits or otherwise of existing organisational performance measurement systems in the light of the advent of e-business into their activities.

6. Discussion

From the literature review, it was expected that an effective e-business performance measurement system would encompass a range of different measures, including non-financial as well as financial measures. This was to some extent born out by the case findings, in that all but two were measuring more than one aspect of e-business performance. Examples of the metrics used included those associated with website performance, e-business processes and customers. However, the case organisations generally appear to have adopted an ad hoc approach to e-business performance measurement. No organisation had a true portfolio of e-business performance metrics. Furthermore, there tended to be a discernable focus for their e-business performance measures, such as financial metrics, customer metrics or process metrics. However, there was never any sense of balance between the measures used. Any mention of the BSC was notably absent in any of the interviews except in the case Wealth Bank.

The literature also suggested that an effective e-business performance measurement system would link e-business performance to strategy. However, only some of the case organisations had performance metrics appropriate to their aims for e-business. Only some of the case organisations had e-business metrics that linked to higher level measures. Thus, there was scant evidence that the BSC or similar framework been used to ensure that e-business performance measurement was linked to organisational strategy.

The case organisations have adopted an incremental approach to amending their existing performance measurement systems for e-business. They seemed to have made as few changes as possible, utilising or adapting existing metrics. In the few instances where completely new e-business metrics were introduced they were simply added to the existing set of performance measures. There is no evidence that case organisations have undertaken any kind of review of their existing performance measurement systems to determine what changes might be needed for e-business. Similarly, capital investment appraisal for e-business was treated no differently from other business decisions. In only one case (Lawco) was the normal capital investment appraisal processes set to one side for e-business investment.

The prime conclusion from the investigation is that the organisations studied did not demonstrate the kind of performance measurement practices with regard to their e-business activities that might have been expected from the literature. We are therefore left to speculate why this is the case.

One possible explanation is that organisations may be concerned about the difficulties and costs of adapting existing performance measurement systems for e-business, and are not convinced about the benefits that may ensue. This is in line with emerging concerns in the literature about the costs of measurement. However, it was far from clear that many of the case organisations had taken a decision not to embark on major changes to their performance measurement systems in a deliberate and considered way. In most of the cases, the impression was given that very little consideration had been given to changing performance measurement systems for e-business.

It may be that practitioners do not view e-business as requiring revolutionary changes in their

business practices. This would accord with a view that e-business is now just business. May be the view from within organisations is that the much heralded impact of e-business was just so much hype. May be that the changes required to accommodate e-business were not so great. May be businesses just took whatever changes were necessary in their strides. It may be that for the case organisations, the impact of e-business is not yet that important to merit a complete overhaul of their performance measurement systems, and so incremental adaptation and change suffices for the moment. Changes due to e-business are still on-going and organisations face continuing uncertainty about the impact of changing technology. As such, the prevailing view with regard to e-business performance measurement is one of "wait and see". May be more significant changes will be required to provide the spur to more radical and comprehensive changes in e-business performance measurement systems.

7. Conclusions

Given that e-business has been heralded as being the cause of major disruptive change, we were expecting that these organisations would have given considerable attention to the challenge of adapting their performance measurement system to e-business. This proved not to be the case. We expected these organisations to have at least undertaken a systematic review of their existing performance measurement systems. Also, given the publicity associated with the BSC in recent years, we expected any changes to performance measurement systems to be underpinned by this or another similar framework. This also proved not to be the case. Although some of the features of the e-business performance measurement systems were characteristic of the BSC, such changes that had been made were essentially ad hoc and incremental in scope. There was a marked reluctance to embark on major overhauls of existing performance measurement systems. This was surprising.

Thus, there are two major conclusions from the research. Firstly, organisations do not currently feel the need to make major changes to their performance measurement system for e-business. Rather they are content to make incremental changes. Secondly, it appears that best practice advice in performance measurement, as exemplified by the BSC, may be much less influential than often thought to be, certainly within the e-business environment.

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