

## MANAGING E-OPERATIONS FOR COMPETITIVE ADVANTAGE

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### ABSTRACT

This paper reports the initial stages of a research project investigating how UK-based organisations undertaking electronic commerce are seeking competitive advantage through the management of their e-operations. Success in e-business depends on the extent to which the dramatic increase in connectivity offered by the Internet can be harnessed to improve efficiency and effectiveness in managing business processes that produce and deliver goods and services. This requires the integration of operations management and information systems both within the organisation and with supply chain partners. Results from a cross-case analysis of seven companies (three manufacturers and four financial service companies) that have converted from bricks-and-mortar to clicks-and-mortar are reported. These indicate that: (1) e-commerce investments are mainly driven by a fear of being left behind by competitors rather than a desire to improve business process performance; (2) e-commerce investments tend to automate rather than re-design existing processes; (3) e-operations are run as a discrete set of processes, with little or no integration between e-operations information systems and those of the bricks-and-mortar operations; (4) there is a lack of formal performance measures for e-commerce investments; (5) legacy systems and a lack of industry standards are major encumbrances to information systems integration.

### INTRODUCTION

Despite the bursting of the dotcom bubble, e-commerce continues to have a major impact on the way that business is conducted around the world. In the United Kingdom alone total e-commerce revenues (B2C and B2B) were worth over US\$17 billion in 2000 (accounting for over 20% of European e-commerce) and are forecast to rise to nearly US\$300 billion by 2004 [10]; an estimated 63% of UK companies now have a website [24]. For organisations that adopt e-commerce, there are likely to be significant effects on all of their functional disciplines. However, to date much of the interest in e-commerce has centred on the finance (e.g. the liquidity, profitability and valuation of the dotcoms), the marketing (e.g. the design of user-friendly web sites) and the human resource (e.g. IT skills shortages) functions. Whilst these are important issues, there is growing recognition that success in e-business also depends on a firm's production and supply processes. A website might capture, or even create demand, but unless the goods and services required by

customers are produced and delivered efficiently and effectively, neither customer satisfaction nor profitability can be achieved. The business processes through which goods and services are produced and delivered have always been a central concern to the academic discipline of operations management. However, to date operations management within e-business has been the neglected function in e-businesses.

This paper reports the initial stages of a research project being undertaken at the Open University Business School that aims to address this deficiency. The research investigates how UK-based organisations undertaking electronic commerce are seeking competitive advantage through the management of their production and delivery operations, in other words, their e-operations. The paper opens by describing the theoretical basis for the research. This draws on literature from both the operations management and information management traditions to develop a framework for investigating the way that organisations have responded to the adoption of e-commerce. The paper goes on to outline the case study methodology used to apply this framework in practice. The second part of the paper reports initial results from the first seven cases in the study. These encompass three manufacturing and four financial services companies, and include examples from both the business to business (B2B) and business to consumer (B2C) markets. Cross case analysis is used to compare and contrast the findings within and between the two industry sectors of services and manufacturing. From this analysis five emergent themes and issues are identified. Finally, future research directions for the work are outlined.

### THEORETICAL BACKGROUND

The dramatic increase in connectivity offered by the Internet has created potential for almost unlimited information flows within and between organisations and their supply chain partners. E-commerce has been defined as the sharing of business information, maintaining business relationships, and conducting business transactions by means of telecommunications [27]. The operations of an organisation are concerned with the management of the business processes that produce the goods and services supplied by an organisation to its customers. The processes of order fulfilment and delivery are at the heart of any business as they are the means through which an organisation satisfies its customers. An organisation can be considered to have e-operations if it uses ICTs in the management of its order fulfilment and

delivery processes. Gaining competitive advantage in e-operations largely depends on the extent to which the information flows afforded by the internet can be effectively harnessed to enhance the management of production and delivery processes. As Grover and Malhotra [11] assert, "in conjunction with marketing, operations and information systems may very well form the backbone of e-commerce advances in organizations". We can therefore look to the literature from both operations management and information management traditions to inform the study of e-operations.

Operations management is concerned with activities in which resource inputs are transformed into outputs. This may involve the transformation of customers, and/or materials and/or information in the production of outputs of physical goods and/or intangible services. Traditionally the academic study of operations tended to focus on operations at the micro-level. However, modern approaches to operations management take a more holistic view of organisational activity, emphasising the linkages between the various micro-operations that constitute an organisation's macro-operations - see for example [22]. From this follows the idea of a business process as a logical sequence of interconnected activities that uses organisational resources to create products and/or services to meet customer needs [6]. Such perspectives of operations fit well with more strategic models of organisational activities, such as Porter's [21] value chain. Operations management is especially concerned with the business processes of order fulfilment and delivery. The business process literature (using titles such as business process improvement, business process reengineering and business process redesign) draws extensively on these concepts. This literature emphasises that business processes are likely to cross boundaries inside organisations (typically those between functions) and between organisations. Supply chain management literature, e.g. [7], takes the business process perspective of operations management beyond the boundaries of the organisation to encompass relevant operations in the organisations of suppliers (and suppliers' suppliers) and customers (and customers' customers). The notion of flow, as exemplified in the business process perspective [12], is prevalent in operations management. Techniques such as production flow analysis, flow process charting, and service blueprinting are widely used to assess movement of materials, people and information in business processes.

Like operations management, information management is also underpinned by systems theory [5] and the transformation model lies at the heart of the consideration of any information system. The analysis of information flows is central to the understanding of information systems. As with operations, the boundary-spanning property of information is emphasised. The added value to be realised from information, as input and output to business processes has been recognised throughout and between value chains, most notably by Porter and Millar [20] and with respect to e-business by Evans and Wurster [9]. Information management also has its own set of methodologies and techniques to aid this analysis (e.g. SSADM, data flow diagrams, systems flowcharts etc.).

Commonly, these methodologies identify a system as having a set of inputs, a set of outputs, and a set of processes that convert inputs to outputs [1]. The study of the processes of order fulfilment and delivery in the Internet era necessitates an understanding of the interaction between operations management and information systems [17]. As Grover and Malhotra [11] note, "this interface is critically important at this juncture, particularly more so since it is highly relevant and not very well understood". Yet this is not virgin territory. The impact of e-commerce on supply chain management has clear echoes of a previous IT application in operations management, namely EDI [23]. The BPR literature emphasises the use of IT in the transformation of operational activity [14] [15] [16] and the impact of information systems integration on business process improvements [2] [25].

The potential benefits available from e-operations seem to centre on the degree of integration that an organisation can achieve within and between its business processes and its information systems. Any investigation of the management of business process in an e-commerce organisation needs to consider the extent of integration achieved both internally and externally. Internal business process integration is the extent to which the business processes for e-commerce within a clicks and mortar model are integrated with those of the bricks and mortar (i.e. a traditional) business processes. External business process integration is the extent to which the business processes are outsourced, including the extent to which any such outsourcing for e-commerce is integrated with outsourcing for traditional business. Another key concern is how the interface with the external supply chain, forward and backward, is managed, especially any disintermediating effects of the new technology. The consideration of information systems integration needs to define the extent to which information systems are integrated internally (both across functions, and between e-commerce and traditional activities) and externally (along the supply chain to suppliers and customers). It also needs to include the extent to which existing (i.e. legacy) information systems are able to facilitate integration (e.g. through the use of EDI, ERP or CRM).

Finally, due regard will need to be taken of the organisational context, a consideration of the customer, e-commerce, and business contexts. The customer context is the extent to which the organisation is engaged in B2B (business to business) and/or B2C (business to consumer) e-commerce. The e-commerce context is concerned with the present business model (i.e. whether it is a dotcom - solely e-commerce based - or a clicks and mortar organisation), its path to that model (e.g. it might be a dotcom start-up, or might have evolved from bricks and mortar to clicks and mortar, or even from bricks and mortar to a dotcom), and the extent to which the business processes and information systems have had to change to facilitate the adoption of e-commerce. The business context concerns factors such as the organisation's objectives (profit seeking or not for profits), its size (multi-national, SME), and its customer base amongst other considerations.

## RESEARCH METHODOLOGY

This research is empirically based, its main aim being to identify current, emerging practice in the management of e-operations. As such, the research is essentially descriptive in character. This, as Meredith *et al.* [18] argue, is the start point of the "the normal cycle of research", in which description is used to form the basis for explanation which can then be tested against reality until, through a series of research studies, a theory can eventually be built. The research seeks to examine the internal business processes of order fulfilment and delivery in e-businesses, identifying any common patterns and contingent organisational and environmental variables. This requires a level of detail and in-depth understanding that is almost certainly best achieved through a case study approach. A case study is "an objective in-depth examination of a contemporary phenomenon within some real-life context where the investigator has little control over events" [26]. For areas like this where there is a paucity of empirical research and existing theory seems inadequate, case studies may offer a route to theory building [8].

The research project is therefore based on a series of case studies chosen from amongst organisations with different features and characteristics, to facilitate comparative analysis. Organisations are being studied in a number of different industries including those producing physical goods, and those delivering intangible services. Similarly, in order to compare and contrast practice across a range of different e-business models, the research includes examples of organisations engaged in B2B and B2C e-commerce, those engaged solely in e-commerce (dotcoms) and those also engaged in traditional business (clicks and mortar). Other contextual factors that may also impact the management of e-operations might include organisational purpose (e.g. profit-seeking and not-for-profits organisations) size (e.g. multinationals, SMEs, etc.) organisational culture and so on.

Data collection is principally through semi-structured interviews with relevant organisational personnel.

Gathering a sufficiency of data on business processes can only be achieved from within an organisation, and so access to the organisation is a prerequisite for this study. Semi-structured interviews give researchers the freedom to explore interesting avenues for investigation as they emerge. It is particularly important to be able to get close to the key organisational actors, not only to gather factual data from them, but - perhaps more importantly - to gain an "understanding of actions and meanings in their ... context" [4]. The use of multiple interviewees in each organisation not only affords greater depth and breadth of data, but also overcomes the problems of unreliability associated with the use of single respondents [3]. The questioning is based on the theoretical framework developed from the literature discussed above, to focus and bound the work [19]. The interview questions are aimed at discovering the firms' objectives for their e-commerce activities, how they are managing their e-operations and how they are adapting their operations to incorporate e-commerce. Interviews are tape recorded to facilitate subsequent transcription and analysis.

## THE CASE COMPANIES

In this paper we report findings from seven UK based companies, three in the manufacturing sector and four in the financial services sector. All of the companies are well-established in their industries and by extending their use of ICT they have converted from bricks-and-mortar to clicks-and-mortar business models. Summaries of the main points from each of the case companies now follow. Some key features of each case are summarised in Table 1.

### Manufacturer 1 - the steel producer

This company, a division of a major European steel producer serves a specialist market of relatively few customers with a range of made-to-order products. The company had been using an EDI system with its customers since the early 1990s and also makes extensive use of email. However, the EDI system is now proving costly, cumbersome and slow. So the company has decided to channel its e-business through the Internet.

Company	Products/Services	e-business model	e-commerce focus
Manufacturer 1	Steel products	B2B	Customers
Manufacturer 2	Pumps	B2B	Distributors/Customers
Manufacturer 3	Pharmaceuticals	B2B	Internal/Suppliers
Financial Services Company 1	Insurance	B2B	Suppliers
Financial Services Company 2	Share dealing	B2B/B2C	Customers
Financial Services Company 3	Insurance	B2B	Customers/Suppliers
Financial Services Company 4	Mortgage application Processing	B2C	Customers

**Table 1 – Main Features of the Case Companies**

This has been done by creating a specialist steel industry portal, developed with in conjunction with a number of its

European competitors. This facilitates access to all the participating companies' websites. It enables customers, suppliers and other divisions within the company to communicate with each other, even if they do not share the same communication software. The intention is to offer multiple products via a group of suppliers, in this way offering choice to customers, and also minimising some of the costs of establishing an e-channel for each of the suppliers. This European collaboration is intended to enable all participating companies to compete more effectively with steel-makers in other parts of the world, and encourage greater use of steel rather than alternative materials. The structure of the portal is also aimed at reducing supply chain and transaction costs by enabling better and speedier flows of information with customers.

Once accessed via the portal, the company's website operates at two levels. Entry is via an open area. From this, only registered customers can access secure website. This aligns most of the company's order and delivery processes through a business communication tool with its customers. These processes address the needs of the full range of the different functions of customers' business from designers and specifiers, purchasing, accounts payable and so on. From the website, approved customers can make enquiries, request and receive quotations, place orders, receive acknowledgements, test certificates, despatch notes and invoices. Additionally customers can register order queries and complaints, whether these concern the quantity or quality of goods despatched.

The website is primarily aimed at automating existing processes, thereby taking out costs, increasing the quality of information, reducing errors, and speeding the order and payment cycle. The site commences in pilot form with selected customers in late 2001, but the ultimate intention is to move all customers to on-line trading. The company's manufacturing processes are unaffected by the website, but customers can track and trace their orders in the manufacturing process. Information on order progress is updated every 24 hours, and late and potentially late orders are flagged. The company believes its website will offer an improved service to its customers and reduce its transaction costs helping it to survive in a fiercely competitive market. The interesting feature of the development is the nature of the direct collaboration with natural competitors. This can be seen as a kind of re-intermediation through collaboration. It also attempts to raise barriers to entry for those competitors who are not taking part.

### **Manufacturer 2 - the pump manufacturer**

The company is a multinational manufacturer of pumps and associated equipment mainly for industrial use. It began to use e-commerce in the mid-1990s when it developed software to assist with pump selection and order entry. The company mostly sells through agents and distributors who use the software to compile orders that are then fed into the company's separate manufacturing information system. The software tool for assembling customer orders is used primarily in the United States where customer culture is more e-friendly. The company

describes some of its other (primarily European) customers, as conservative in nature with a preference for traditional, mostly face-to-face ordering methods. The software is also a web-based tool but very few customers currently have direct access to the software for direct ordering. This is because of the very technical nature of pumping equipment and the level of expertise required to order the correct equipment. Thus the main function of the software is to support the company's local agents.

The company's main motivation for its use of e-commerce was to differentiate itself from its competitors by being a service leader, rather than a follower, in what is a conservative industry. At present no distinction is made between orders received via the software, and those received by conventional means. The manufacturing process does not distinguish between the two types of orders. The company would like to be able to remove some of its intermediaries, hoping that some of its more sophisticated customers may be willing to use the web-based ordering software directly. However, it acknowledges that this is difficult as there are issues here of customer education, as well as the existing relationships with its distributors. The geographic spread of its US markets, and the technical nature of its products and of its ordering process, also means that the company is very dependent upon its American distributors and disintermediation is impractical.

The company makes very little use of e-commerce with its suppliers. Its current procurement spend is very fragmented. However, it has been able to reduce the number of its suppliers, so it may be able to revisit the issue to see where electronic applications might now be introduced. One of the company's major procurement spends is on raw castings direct from foundries, which are typically technologically unsophisticated and offer only limited opportunity for electronic procurement. The company also recognises that there could be efficiency gains from integrating its purchasing and information systems with those of its suppliers.

The company describes its adoption of its e-applications as evolutionary. There was some resistance to change from within the organisation resulting in loss of some personnel. Other issues included where to make the e-commerce investments and establishing priorities. Cultural differences were also cited as problematic as the company deals with numbers of international customers and some were unwilling to articulate directly what their requirements for an e-ordering software tool would be. The main motivations for adopting e-commerce were the fear of actions of major competitors, many of who were announcing large e-commerce investments, and customer expectations. Whilst internally there was strong support from management for e-commerce applications, conservative attitudes acted as a brake. The company feels that it is as yet too early to say whether its e-commerce applications have been successful. It is not conducting any formal performance measures, feeling that measuring e-commerce is difficult. The company does not know whether its on-line ordering tool is increasing sales, arguing that in any event it would be difficult to know if

any increase in sales are incremental or substitutional. The company believes that once e-commerce applications are extended to customers, they will become reliant on them and would not like to see them withdrawn. As such, e-commerce is seen as a means of locking-in customers and distributors to the web-based ordering process thereby raising the barriers to exit.

### **Manufacturer 3 - the bio-technology company**

The company was founded as a research and development organisation. It has recently received a government licence to manufacture and sell its products, mainly therapeutic pharmaceuticals. It expects that this new manufacturing function will significantly change its business. It does not market or sell its own products, this being done through a distributor. Although a small company, it is globally diverse, with operations in the UK, the USA and Australia. Some eighteen months ago the company merged with another bio-tech organisation which was much more advanced in its use of e-commerce, both in terms of information systems and in applications such as computer-aided molecular design. However, for strategic reasons, the company has now divested itself of this partner, and says that it expects it will feel keenly the loss of the IT expertise.

The company is not using e-commerce in sales, but rather, as a communication tool between its various sites. It needs to be able to manage documents very securely, as well as to control its inventory of raw materials. It is also developing e-commerce applications for financial accounting, and setting up links between its various logistics groups and the accounts department, with that information made available across key managerial functions. At the moment, the company has not got the necessary management systems in place, and grappling with the technology issues involved in this is presently a very large concern. The company aims to move towards electronic ordering. Its presently uses a manual system, based around faxes, written and telephoned orders.

The company has a remote rural location and consequently finding suitable technical staff to implement the new systems is difficult. The company has not yet been able to integrate its systems to any appreciable extent with those of its suppliers. At present the company still uses manual systems for ordering supplies. There is as yet no appreciable integration, either internally, or with the systems of its suppliers. However, it did point out the electronic availability of information made it easier to obtain approved raw materials for its products. It is now possible to go to a supplier's website to check certificates of analysis, inventory levels and to whom raw materials have been already been supplied. The company hopes eventually to be able to use this information to provide forecasts to aid production planning. At the moment, the production planning process is part manual and part software-based. The company would like to use e-commerce processes in order to assist production planning, especially as it requires and relies on specialised, certified raw materials, and needs to be able to check on their availability. However it feels that it must first get its

manual systems running properly before it can fully turn to the MRP system it is intending to put into place. As a small company investment in IT poses two significant problems. Firstly, specifying costly hardware that will not rapidly become technologically obsolete is problematic. Secondly, there are issues around software and IT training. There is a lack of time in which to provide training, which tends to be done on a semi-formal basis (e.g. during lunch hours).

The company does not have any formal financial performance measures for e-commerce in place. Projects are reviewed upon completion in order to learn from their success or otherwise. The company's main objective is to bring down its costs of goods sold. One key success factor would be using an inventory management system to reduce its inventory levels. In a small company which at present has no revenue, finance is inevitably an issue. The company quite freely admits that there are many issues that it is facing in both understanding and implementing technology, and says that it would tend to spend any additional available resource on increasing manufacturing capacity rather than on implementing electronically based information systems and processes.

### **Financial services 1 - insurer 1**

The company is the UK arm of a multinational insurer of corporate risks, including political risks, for its clients in the aviation and marine industries. It places its risks on the London insurance market through Lloyds and various re-insurance companies. The company had been using EDI messaging since the early 1990s and began to use e-commerce in 1997. The company is using e-commerce in its low value, high volume business. It sees this as offering an immediate benefit from automation but at minimal risk to the company. It uses e-commerce mainly to obtain quotes from its suppliers, the insurance underwriters. The company can post information about the risk on offer, and the underwriters can respond, via the web-based exchange. A structured workflow permits, in some instances, the establishment of an electronic file and subsequent contract. Presently some 2% of the company's transactions are established in this way. The company's motivation for e-commerce has been the threat of competition coupled with the lower transaction costs available through electronic 'self-service'. The company also wishes to be seen as a leader in an industry that has been slow to embrace technology. The company believes it can create value by creating client 'stickiness' - embedding value to the client within the electronic services that are on offer and thereby raising the barriers to exit for its customers.

The company runs its e-commerce operations quite separately from its traditional business, serving only very specific market segments electronically. There is low integration of the company's business processes and information systems at present. Many of the e-commerce links are not fitted into existing systems and the organisation's staff who handle the e-business transactions do not handle its other business. Many of the e-commerce

systems do not fit within the company's core information systems.

The insurance industry has very conservative attitudes – based on the long history of the London insurance markets – that prevent e-commerce from becoming both more widespread. A lack of agreed technical standards has also contributed to the slow take-up of new technology. The company acknowledges that there is a need for common standards and feels that these are most likely to be achieved through collaborative ventures. Within the company there is risk perceived in being at the cutting edge of new technology and debate is continuing as to whether it is better to be a leader, or a follower, in applying and integrating new technology. Rapid technological obsolescence is seen as an important issue.

The company has no specific formal performance measures in place for e-commerce. However it sees that this might be done through, for example, the ratio of the volume of e-commerce to the value of e-commerce, or the number of underwriters participating in the online venture. It does not employ any formal measures to assess cost, but says that some are obvious. There does appear to be a metric on the volume of transactions. This is measured in terms of the number of transactions the company is seeking to place, against those actually placed. There is also a metric on the number of underwriters participating in a given month. No post-analysis of the cost-benefits of the company's IT and IS investments is carried out.

### **Financial services 2 - the market-maker**

The company is a 'market-maker', facilitating the sale and purchase of shares in small and medium sized companies (SMEs). It specialises in floating SMEs on this market to enable them to raise capital through publicly traded shares. The company launched its website in February 2001, enabling electronic on-line dealing to run in parallel with its traditional telephone-based trading. The company's corporate clients (mostly institutional investors) continue to deal mostly via the telephone. The on-line facility is mainly used for retail business (i.e. private individuals). The proportion of business conducted on-line is currently small, although no attempt has been made to quantify it. E-commerce has not yet made an impact on the company's conventional business operations. The company sees its online facilities mainly as an opportunity to test the connectivity of electronic commerce and to build up customers' familiarity with the new technology. By applying e-commerce only to a small proportion of its transactions, it believes it can achieve competitive advantage on a high-volume/low margin basis. The company wants to take some of the pressure away from the dealing room, and eventually turn the website into a revenue producer in its own right. It sees private investors a potentially high growth market that can be best served by on-line trading where it can create 'stickiness' for its customer base through both familiarity with, and ease of use of the technology. The on-line facility is run jointly with a collaborator who has both the necessary systems and experience in share dealing.

The company's objective in using e-commerce is to achieve greater efficiency within the retail sales that the online facility currently supports, based on a low margin/high volume formula. Orders received electronically are still channelled into conventional processes. The internal integration of its information systems is acknowledged as an expensive issue for the company. The company has gone some way towards integrating its information systems across its internal functions. They have recently invested heavily in new IS infrastructure which integrates front and back office systems. This has enabled some staff reduction to be made. The company maintains that it is still in the process of evaluating the success of its e-commerce activities. Previously they plotted the hit rate on the web site against trading turnover, but have recently ceased to do this, believing it was not an accurate measure as it was hard to correlate. The company noted the difficulty of devising suitable performance measures for e-commerce applications and the fact that the fashionable standard for measuring website success keeps shifting.

### **Financial services 3 - the insurance and risk management company**

The company is a multinational UK-owned insurance broker, placing insurance business for clients, advising on risk management and providing funds management. The company first used email some 5-6 years ago. Two years ago, it launched a web-based system aimed at its medium sized company customers whereby claims could be reported electronically and their progress checked by interrogating the web-based system. Loss adjusters are also able to interrogate the system to check policy cover. Thus, the electronic claims system serves as a communication tool between the company, its business customers, and its loss adjusters. The company's most recent e-commerce venture is the provision of the facility, through a partner organisation, to trade all insurance products and claims over the Internet. The company has also set up partnerships with affinity groups with which it is working to set up links via their branded web-sites to provide insurance cover for interested clients.

The organisation's main objective in the use of e-commerce is to improve efficiency. It has many branch offices, both domestic and international, but can foresee a time when e-commerce will allow for a reduction in their number. The company seems acutely aware of the cultural and social issues involved in electronic commerce, recognising that young people in particular, are becoming used to working with e-commerce and expect to have products available that way. Many people are no longer working conventional hours and there is an increasing expectation that product information, and sales and support channels will be available around the clock.

In terms of the integration of business processes, clients still have the choice at the moment of having their records issued on paper, on CD or on a disk. But the company would eventually like a direct, electronic site-to-site transfer of records. The company acknowledges that this is a problematic issue, as achieving standards within the

insurance industry can only be done via collaborative ventures. The on-line claims facility was developed with three other insurers and designing a policy document that met the needs of each was difficult and time-consuming. It was only because the product was very specific that a claim form was eventually developed. The company felt that the issue of industry standards could only be met through collaborative ventures, at the same time acknowledging that such ventures are very difficult.

The company feels that its internal information systems are quite well integrated, with the financial information from the branch structure feeding into one centre. An overall picture can be extracted from this when required. The company does not feel that its conventional business operations have changed significantly because of e-commerce. They do not send as many letters, using more emails, but feel that the traditional model of business is only gradually being scaled back by e-commerce. They recognise that the insurance industry is very conservative, only adapting slowly to change, and is reluctant to give up entrenched working practices, which are mainly face-to-face.

The company is not conducting any formal performance measurement of its e-commerce activities. They point out that where information is initially obtained from a website, and subsequently confirmed by telephone, there is an issue of whether performance measures would be tracking an electronic, or a telephone transaction. The company does have financial measures by which it assesses its conventional business operations. Additionally, it reconciles a monthly budget against the branch offices each month, but this is not broken down into conventional versus electronic transactions. They feel it is often very difficult to determine which business is coming in by which route, and believe that that it may be the case that business may equally have been obtained through other channels.

#### **Financial services 4 - the retail bank mortgage department**

This case examines the mortgage application processing department of a major retail bank. Previously, the bank's mortgage sales were based on customer contact with a mortgage seller in a local branch. The bank is now attempting to move some of its mortgage products online. The situation is complicated by the fact that the bank has recently taken over a competitor that specialised in mortgages. The former competitor's range of products had reached a more sophisticated stage in terms both of online availability and the associated processes. At present the bank is running the acquired products in parallel with, rather than absorbed into its existing systems.

The bank is using electronic commerce mainly within a B2C application. Customers can submit their mortgage applications in one of three ways. They can still use the traditional paper-based system; they can telephone directly to the mortgage department whose staff will input details directly into the mortgage department's system; or they can

apply online via the bank's website. However, by whatever means the application arrives, even online, the application information still needs to be scanned, or re-keyed in order to be entered into the bank's systems for processing the application. At present, full on-line applications are only available on the former competitor's website; the bank's own website has only a 'call me' button, whereby the customer provides a contact telephone number and the bank's mortgage department calls back to collect relevant application details. Some of the bank's mortgage processes have been successfully integrated with those of suppliers. For instance, the bank has been able to reduce the number of valuers it uses, as property valuations can now be returned online via an extranet link with the valuers. Additionally, independent financial advisors act as intermediaries marketing the bank's mortgage products, although it is not clear what proportion of this is being done online.

The bank appears to be having difficulty in managing the change to e-commerce. The recent addition of the former competitor's mortgage products has added an additional layer of complexity on top of other changes. The bank recognises that managing the e-processes alongside the conventional ones is cumbersome and not cost effective. However the bank is clearly struggling with the integration of the business processes and information systems for its own mortgage products, with those it has acquired from the competitor, and there is a large amount of duplication within the current processes. The bank says that e-commerce is not a big priority for its mortgage applications, and does not feel that there is a strong financial or business case to be made. Nonetheless, it is undertaking some 'front-end' development, whereby it aims eventually to make its own group of mortgage products available via the web. The bank feels that it needs to demonstrate customer benefit from e-commerce in order to obtain more online business.

The bank is not carrying out any formal performance measurement. It is aware that the number of visits to web pages can be measured, but is not monitoring this. The bank is conscious that it needs to develop more of an 'end-to-end' process before it can increase and improve its e-commerce applications and effect any performance evaluation of them. At present the online mortgage applications account for only 2-3% of the bank's mortgage business and the bank prefers to concentrate its e-commerce efforts on developing retail online banking, which it sees as a more profitable activity in terms of achieving competitive advantage. Notwithstanding, it is making some efforts via its internal IT department, to introduce more front-end operability, but there seems to be no particular urgency attached to these efforts.

#### **EMERGENT THEMES AND ISSUES**

Some of the key findings from an analysis of each of the cases are drawn together in a cross case analysis displayed in Table 2. The following key issues emerge from this.

Organisation	Use of e-commerce	Motivation/objectives	Risks and problems	Competitive advantage
Manufacturer 1	- Internet portal	- move away from EDI - customer focus - reduction of supply chain costs	- resistance to change both internal and external - ensuring successful collaboration	- re-intermediation and collaboration; raised barriers to entry
Manufacturer 2	- Software tool for ordering process	- differentiation from competitors	- resistance to change both internal and external - establishment of priorities cultural issues	- differentiation - raising exit barriers
Manufacturer 3	- Primarily e-mail communications internally and using web-based information systems to check suppliers' stock	- to support manufacturing production planning	- recent loss of IT support following a de-merger - would prefer to use surplus financial resource to increase manufacturing capability - IT/IS training and implementation	- better co-ordination within the supply chain
Financial services 1	- information exchange for risk placing and underwriting - used for low-value high-volume business	- to speed up exchange of information and establish contract - desire to eliminate perceived threat from competition - desire to create client loyalty, 'stickiness' - lowering of transaction costs through client self-service	- lack of industry standards - conservative attitude within the industry - towards technology fit of e-commerce systems with the company's conventional systems - risks associated with being a technology leader	- differentiation on cost and technology - attempt to create barriers to exit
Financial services 2	- online share dealing	- test of connectivity - using the Internet channel to leverage increased business - desire to target private investors as a 'high growth' market	- expensive investment in IT/IS - cultural issues; conservative industry; negative image of share dealers	- position as market-leader - tapping into new and potentially fruitful markets
Financial services 3	- online claims reporting - sale of insurance products via partner organisations in other industry sectors	- need for 24/7 operations - improved efficiency	- difficulty of collaborative ventures - multiplicity of sales channels = multiplicity of processes (difficulty of streamlining)	- responding to customer needs - exploiting non-obvious partnerships (e.g. with other sector)
Financial services 4	- online mortgage information, application, valuation	acquisition of competitor whose online systems are more advanced	- lack of conviction about benefits from e-commerce - non-interoperability of processes	- no obvious source at present

Table 2 – Principal cross-case comparisons

1. Investment in e-commerce is primarily technology driven. The main motivation appears to be to make use of the Internet for business because use can be made of it. Underlying this is a fear of being left behind by competitors, that if the company does not seize the opportunities on offer, it may be left at a competitive disadvantage by those that do. Companies do not always seem to have a clearly articulated strategic logic for their e-commerce investments. Improving business process performance seemed to be a largely secondary consideration. All companies seemed to be seeking lower operating costs through the potential efficiency gains available through e-commerce, although some recognised that this would take time to achieve. Whilst some companies spoke of using e-commerce to improve customer service and create customer 'stickiness' some of this may have been *posthoc* rationalisation.
2. Investments in e-commerce are tending to automate, rather than re-design existing processes. This reinforces existing, largely functionally based, organisational structures rather than creating process-based structures. This may be a surprising finding especially given all the interest in business process re-engineering (BPR) over the last decade, much of which was driven by those who saw the possibilities for IT driven business process improvement. It very much runs counter to the calls for the 'obliteration rather than automation' of existing organisational activities led by Hammer [13] and other advocates of BPR.
3. E-operations are run as a discrete set of processes, with little or no integration between e-operations information systems and those of the bricks-and-mortar operations. Little or no attempt is being made to manage e-processes either concurrently or within traditional processes. In some cases this perhaps stems from a desire to keep e-commerce as a separate activity, either to reduce the risk to existing business and/or to learn as much as possible from early forays into e-commerce. In other cases, problems with IT hardware or software, (discussed in 5 below) militate against integration. An interesting manifestation of the separation of clicks from bricks can often be observed in the attire of those working in the two areas, where more casual workware (open-necked shirts, chinos etc.) are as much *de rigueur* as that of their more formal counterparts (business suits, ties etc.)
4. There is a lack of formal performance measurement in e-commerce. Scant attention is being paid to the performance evaluation of either on-going e-operations, or to evaluating of the impact of e-commerce investments. Given the importance of e-commerce to these companies, albeit in the future if not presently, and the cost of some of the investments made, this seems surprising. A logical assumption might be that these initial investments in e-commerce would be subject to the closest scrutiny, as organisations seek to determine the future scope and

direction of their e-business. Where formal performance measures are applied, they are used on an *ad hoc* basis and there is no consensus as to which e-commerce performance measures are effective. This seems a neglected area of study and practitioners are evidently confused. One interviewee decried the changing fashions in e-commerce performance measures. There is clearly a need for some consensus that can offer guidance to those engaged in e-commerce.

5. Legacy systems and a lack of industry standards are major encumbrances to information systems integration. The legacy system issue is primarily an internal factor within organisations, and is particularly acute where organisations have been subject to merger and acquisition. This is by no means surprising as to undergo an organisation-wide IS change is bound to involve major expenditure. However, it is clear that ongoing IS incompatibility represents a significant barrier to the integration of e-business within larger organisations. It is much easier and cheaper for small business to undertake complete wholesale replacement of both hardware and software. The lack of industry standards is, of course an external issue, but it has a major impact on those companies operating in an industry that relies on the widespread interaction of many inter-linked organisations offering very specialised services. This is typically the case in the financial services industry and is perhaps typified by the insurance industry. It is clear that in this sector in particular greater use of e-commerce B2B is being held back by lack of agreed standards, perhaps as much as by the prevalent conservative culture of the industry.

It should be noted that no attempt has been made within this research to determine the success of these companies' moves into e-commerce. Indeed, how to define and measure organisational success in e-commerce is a major issue in its own right. As such, it is to be emphasised that this research is not attempting, at this stage, to judge whether the approaches observed in the case companies represent good or bad practice. The main objective of the research is merely to describe and catalogue those practices. One of the avenues for further research would be to attempt to determine what practices, under what circumstances are more likely to lead to organisational success in e-commerce.

#### FUTURE RESEARCH DIRECTIONS

This paper has reported findings from the first seven cases of the research project. These findings must be considered as emergent and tentative at this stage and treated with caution. More detailed analysis of the data is required. Nonetheless, the initial findings offer some pertinent insights into how firms in two important sectors of the UK e-economy are striving to achieve competitive advantage through their e-operations. The findings also point the way for future research. In the next phase of the study, the research will be extended to include examples of pure dotcoms as well as firms in other industry sectors. Data

from the various industry sectors and business models will be compared to see where, and how, organisations are most effectively gearing their business processes to meet the challenges of, and to gain competitive advantage from, e-commerce.

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