



Digital/web-based technology in purchasing and supply management: a UK study

David Gallear

Brunel Business School, Brunel University, Uxbridge, UK

Abby Ghobadian

Henley Management College, Henley-on-Thames, UK, and

Nicholas O'Regan

Bristol Business School, University of the West of England, Bristol, UK

Abstract

Purpose – To date little is known about the actual level of utilisation of digital/web-based interaction technologies in purchasing and supply management (SM) in the UK. This paper seeks to address this gap in the extant knowledge through empirical research in a UK setting. It examines the level of usage, the uses, the perceived benefits, and future perspective on the use, of web-based technology in purchasing and SM.

Design/methodology/approach – An empirical survey of UK-based organisations was undertaken. Information simultaneously collected on the buyer-supplier relationship orientation of the firms in the sample was used to test the proposition that the use of web-based technology leads to stronger collaborative relationships with suppliers.

Findings – Data obtained from 156 valid responses indicated that six in every ten organisations use web-based technology to support purchasing and SM activities, but that the usage is lower in small to medium-sized enterprises. The main uses reported are for communicating with suppliers, for marketing products/services, and for locating technical data. Making purchases over the internet was significantly more prevalent in organisations exhibiting relatively more partnership orientation.

Practical implications – The findings provide only limited evidence in support of the proposition that the deployment of web-based technology leads to stronger buyer-supplier relations. However, findings do suggest that the effectiveness of the purchasing and supply function can be enhanced through greater use of web-based technology for online purchasing and for efficient consumer response.

Originality/value – The paper establishes salient UK managerial perception on the strategic and operational importance of web-based technology adoption in purchasing and SM.

Keywords Purchasing, Supply chain management, Communication technologies, Buyers, Suppliers, United Kingdom

Paper type Research paper

Introduction

The digital revolution on the web/internet is believed to be having a major impact on the performance of firms' purchasing and supply functions. Recently, there has been a growing interest in the use of information and communication technologies in purchasing and supply across many industry sectors. Such deployments come hot

The authors wish to express their thanks to the Institute of Logistics and Transport for its support and cooperation in this study and to all the companies that participated.



on the heels of the emergence in the late 1980s of inter-organisational collaboration in the form of cooperative buyer-supplier relationships.

As late as the early 1990s, transactions between industrial or commercial buyers and suppliers that relied on what are now referred to as “arms length” agreements based on market price (Hoyt and Huq, 2000) were the norm. Subscribing to the idea that a long-term relationship with customers or suppliers is a potentially valuable means of securing commercial advantage (Boddy *et al.*, 1998), inter-organisation collaboration between firms has since emerged as a common feature of high-performing firms (Harland *et al.*, 1999).

The use of digital technologies and the internet as a communication platform has been advocated as a significant route for developments in the operation and strategic management of supply (Croom, 2005) and consequently for providing important new avenues for wealth creation (Amit and Zott, 2001). It has, for example, been proposed that stronger buyer-supplier relationships develop when supply chain integration increases as a result of the deployment of such systems (Frohlich and Westbrook, 2001; Archer and Yuan, 2000).

Despite the perceived importance attached to the enabling capacity of the internet and web-based applications across the spectrum of business operations, empirical research relating to the actual use and to the benefits derived from the use of digital/web-based technology (DWBT)[1] in the specific area of purchasing and supply management (SM) is still much in its infancy. Consequently, much of the published work in this area is in the form of case studies and conceptual or descriptive frameworks (McIvor *et al.*, 2000; Tang *et al.*, 2001; Johnson and Whang, 2002), or tends to focus primarily on internet purchasing (Boyer and Olsen, 2002; Geary and Zonnenberg, 2000; Min and Galle, 1999). As Kehoe and Boughton (2001) allude to, with the hype that surrounds the internet and its potential, it is important to place current practice in context. This paper seeks to address this gap, and establishes salient UK managerial perceptions on the strategic and operational importance of web-based technology adoption in purchasing and SM: what in practice in purchasing and SM is web-based technology used for?; what are the perceived benefits derived from its use?; and is its use associated with stronger buyer-supplier relationship orientation?

The paper is structured as follows. First, we provide an overview of extant research in this area and hence present the foci of the present study. Next, we describe the methodology of the study. The following section presents our findings and analysis. In the final section, we present our summary and conclusions, and describe practical implications of the research findings.

Background and research foci

Evident in the literature is a strongly held belief that the internet and web-based technologies (for example, broadband and wireless technologies) provide the basis for improved performance across a range of business functions or processes including purchasing and SM (Lancioni *et al.*, 2003). Electronic trading originally facilitated through the use of electronic data interchange (EDI) networks has been in use for nearly three decades, although as Kehoe and Boughton (2001) noted, many small suppliers have been excluded from EDI adoption due to the complexity of early packages, rival standards and relatively high-associated costs. They further point out that whilst initial internet attention has focused principally on the role of electronic

commerce in business-to-consumer applications, business-to-business applications facilitated through web-based technologies naturally extend over supply chains and offer the opportunity to make step change improvements in this area. Web-based technologies, such as e-mail enabled applications, shared databases and market database analyses and extranets, are believed to provide effective and efficient ways in which, for example, buyers can rapidly gather information about products and services available from potential suppliers, evaluate and negotiate with preferred suppliers, implement order fulfilment over communications links, and access post-sales services (Archer and Yuan, 2000).

Although studies on the broad subject of information and communication technology (ICT) usage in general in business and commerce are prevalent, studies specifically considering the use of web-based technologies in the purchasing and SM context appear sparse. An examination of the literature indicates that much of the empirical work in this area has been in the form of case studies. For example, Roberts and Mackay (1998) presented a case study based on BT SM to examine how electronic commerce could be used to support a portfolio of supplier relationships. They concluded that whilst many factors govern different types of relationships, the sharing of a range of information across the portfolio of relationships was fundamental to success. Au and Ho (2002) also used a case approach – of a leading manufacturer of clothing in Hong Kong – to substantiate the application of a business-to-business electronic commerce model for enabling supply chain management. They highlighted the importance of firms gaining a thorough understanding of the impact of electronic commerce on inter-firm relationships and the role they play in a supply chain before engaging in “the virtual world”.

Turning our attention to larger scale multi-respondent empirical work, the Butler Group (1999) noted how most existing analyses relating to information technology are based on vendor shipment figures or technological trends, but miss out on one of the most important aspects – “how people are using it, and their intended directions for future use”. Their study of 5,790 organisations throughout the UK examined respondents’ position on the buying cycle for 12 different types of application software. Supply chain management application software was ranked as the least used (by 17.1 per cent of respondents), in contrast to financial management information systems (used by 97.1 per cent) - the most widely used, to human resources (71.6 per cent) and to customer relationship management (23.4 per cent). The study treated SCM application software as a single variable and did not attempt to break it down according to specific uses.

Arguably one of the most wide-ranging studies carried out into the use of ICT (DTI, 2003), concluded that while companies have invested heavily in all sorts of ICT, they have in many cases “found themselves with a depreciating asset, and less than hoped-for benefits” and furthermore, that a “clear divide between the dynamics of medium and large businesses’ ICT and that of micro and small businesses” was evident – a divide which is also evident in terms of firms’ purchasing strategy arrangements (Mudambi *et al.*, 2004). As part of the DTI study of over 8,000 organisations in the UK and ten other countries, some measures relating to ICT adoption in the purchasing and SM domain were obtained. The study found that 29 per cent (the international mean) of businesses shared information with their suppliers online (UK = 24 per cent), 15 per cent provided information about future requirements forecasting online (UK = 11 per cent), 50 per cent place orders online

(UK = 54 per cent), and 27 per cent make payments online (UK = 25 per cent). However, the study concluded that the sharing of information with suppliers showed a declining trend, although ordering and paying online were growing in most countries including the UK. This study also examined, although at only a broad aggregate level, whether or not businesses internal systems were integrated with those of their suppliers or customers. 18 per cent stated yes with suppliers (integrated, integrating, or plans in place to integrate), and 28 per cent stated yes with customers. Specific uses at a more detailed level (for example to pay for supplies, or to identify suppliers), were not however separately measured. Finally, the DTI (2003) study found that across all countries, cost (42 per cent of companies), rather than demand side factors (16 per cent of companies) was the main driver (or perceived benefit) for adopting online technologies *per se*.

Whilst each of the case studies and empirical studies identified here provide useful insights into various aspects of web-based technology (or ICT) adoption in a wide range of business settings, and some directly or indirectly linked to the supply chain management context, none of the above studies have sought to explicitly focus on ascertaining the actual level of use, the uses and the perceived benefits of deploying web-based technologies in the specific area of purchasing and SM in UK companies. As can be seen from the above analysis, and despite the wealth of conceptual development and anecdotal commentary on the perceived worth of web-based technologies in purchasing and SM, to date the existing multi-respondent empirical studies have included only a limited range of uses and perceived benefits in their investigations.

Empirical research exploring the link between web-based technologies in purchasing and SM and buyer-supplier relationship orientation is even more conspicuous by its absence. Tang *et al.* (2001) proposed a conceptual model to demonstrate the rationale of the buyer-supplier interaction with information service provider's mediation in the electronic commerce environment. Archer and Yuan (2000) based on their conceptual examination of buyer-supplier relationship life cycle activities, argued that technology could be used to encourage and facilitate customer-supplier relationships. Beyond such conceptual contributions however, no empirical studies that have explicitly investigated the link between web-based technology usage and buyer-supplier relationship orientation have been identified.

Finally, beyond the DTI (2003) study already discussed, international comparisons on the use of web-based technologies in purchasing and SM are difficult to find. An examination of the literature identified one study by Min and Galle (2003) that looked at the adoption of e-purchasing. In this study, of US-based firms "e-purchasing" was defined as a purchasing practice that utilises electronic commerce to identify potential sources of supply, to purchase goods and services, to transfer payment and to interact with suppliers. Min and Galle (2003) reported that more than half of the respondents (55.5 per cent) indicated that, they had used some form of e-purchasing. Furthermore, amongst those that had not used e-purchasing, approximately three quarters (73.2 per cent) indicated that they would consider using it in the future.

It is against this background that the research reported in this paper adopts an empirical survey approach to examine a number of salient issues in the UK context:

- the usage and uses of DWBT for purchasing and SM;
- firms' perception of the importance of web-based technology implementation in the future and hence its projected use in the future in purchasing and SM;

- the perceived benefits derived from web-based technology utilisation in purchasing and SM;
- the effect of organisational contingencies (firm size and type) on the use/non-use of web-based technology in purchasing and SM; and
- the relationship between the use profile observed and firm's buyer-supplier relationship orientation.

Methodology

The instrument used to gather the data were a postal survey. A questionnaire, primarily based on five-point Likert measurement scales was drafted. The variables used in the study were derived from examining prior research, commentary and reports of the application of web-based technology in the purchasing and SM area of operations, as found in the literature (Iacovou *et al.*, 1995; Giaglis, 1999; Amit and Zott, 2001; Insigna, 2001; Turban *et al.*, 2002; Caputo *et al.*, 2004). Two scales were derived, the first comprising seven proposed uses of web-based technology for purchasing and SM. These were:

- (1) finding suppliers;
- (2) communicating with suppliers;
- (3) locating technical data;
- (4) making purchases using the internet;
- (5) marketing your products/services;
- (6) efficient consumer response (ECR); and
- (7) virtual trade shows.

The second comprising nine proposed benefits that might be gained from the application of web-based technology in purchasing and SM. These were:

- (1) reduced cost of accounts payable arising from purchasing activities;
- (2) reduced supply delivery lead time;
- (3) enhanced delivery reliability of suppliers;
- (4) reduced cost of managing the purchasing function;
- (5) reduced product/service development time;
- (6) reduced supply uncertainty, and hence downtime for the organisation;
- (7) enhanced flexibility to cope with changes in demand volume for your products/services;
- (8) enhanced flexibility to cope with changes in product/service variety demands; and
- (9) reduced cost of purchased goods/services.

In this study, digital/web-based technologies are defined as: e-mail and e-mail enabled applications, the internet, extranets, EDI, electronic forms, electronic funds transfer, bulletin boards, world-wide-web search engines and shared databases.

Six senior purchasing and supply executives evaluated the instrument prior to its distribution. They were asked to comment on the relevance, validity, comprehensiveness and clarity of the research instrument. Revisions were suggested and adjustments were

made where necessary. This step provided an important functional perspective and thus confidence that the instrument was fit for purpose and unambiguous. The instrument was administered to a random sample of purchasing and supply managers of UK firms, identified through the UK Institute of Logistics and Transport institutional database. Usable responses were received from 156 firms.

Findings

Use of web-based technology in purchasing and supply management

Six in every ten firms in our sample (60 per cent) reported the use of web-based technology in purchasing and SM. That is to say, the application of web-based technology in the activities performed by purchasing and SM personnel. Overall, the proportion of users appears to be quite low. The main purposes reported by users were communicating with suppliers; marketing products/services; and locating technical data. The least prevalent uses of web-based technology in purchasing and SM were for the downstream associated activities of ECR and virtual trade shows. The uses:

- as a percentage of the web-based technology users only; and
- as a percentage of the respondent sample as a whole,

are shown in Figure 1.

Surprisingly, the use of web-based technology for finding suppliers was reported by just over half of the web-based technology users – a figure lower than expected. Furthermore, and despite being the most popular use, just over half of all respondents reported the use of web-based technology for communicating with suppliers – again, a figure lower than expected for this quite basic use. Given this observation of low adoption, we were immediately interested to discern if organisational contingency factors may have had an impact. A χ^2 test of independence was performed to

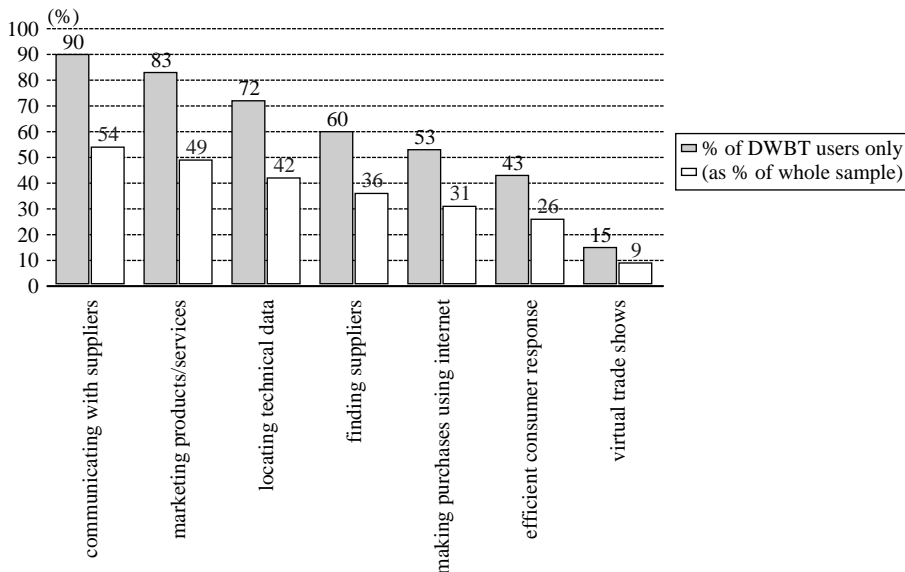


Figure 1. Main purposes of using web-based technology for purchasing and SM)

explore the relationship between use/non-use of web-based technology and firm type (i.e. manufacturing or service based) and firm size, respectively. The test revealed no significant difference in web-based technology use on the basis of firm type. However, the test revealed a significant difference in terms of firm size (Pearson's $\chi^2 = 0.337$, $p = 0.01$). Examination of the descriptive statistics indicated that the use of web-based technology was significantly more prevalent in large firms (69 per cent of large firms) than in SMEs (only 46 per cent of SMEs). This is consistent with Min and Galle (2001) who suggested that organisation size is believed to influence the electronic commerce adoption practices of firms. Although their work did not deal specifically with e-commerce based purchasing, they noted that the "common rationale is that small firms are lacking organisational readiness in adopting e-commerce due to their less sophisticated information technology infrastructure, limited financial resources and weak market positions" (Min and Galle, 2001).

All participants (web-based technology users and non-users) were asked how important they thought the use of web-based technology would be for the purposes listed approximately 18 months into the future. The most important perceived future uses (in rank order) were found to largely mirror the main existing uses. This is shown in Figure 2. The most significant change concerned communicating with suppliers, with an extra one third of respondents indicating that the use of web-based technologies for this purpose would be important in the future. The second most significant change concerned ECR. Whereas only one quarter of organisations were already using web-based technology for ECR, over two thirds believed its use for this purpose would be important in the future. On average, the perceived importance of deploying web-based technologies in the future rose by one quarter.

A comparison of the non-users future perspective to the users future perspective revealed no major divergences in terms of the rank order of uses (i.e. from the overall trend shown in Figure 2) although on average, the proportion of non-users perceiving web-based technology to be important in the future was one quarter less than the proportion of users. In addition, it was for uses associated with the demand-side as opposed to the supply-side of the supply chain that the non-users were relatively less convinced of the future importance of web-based technology implementation. For example, 36 per cent less non-users than users attached future importance to the use of web-based technology for marketing products/services, and 50 per cent less non-users than users attached future importance to the use of web-based technology for virtual trade shows.

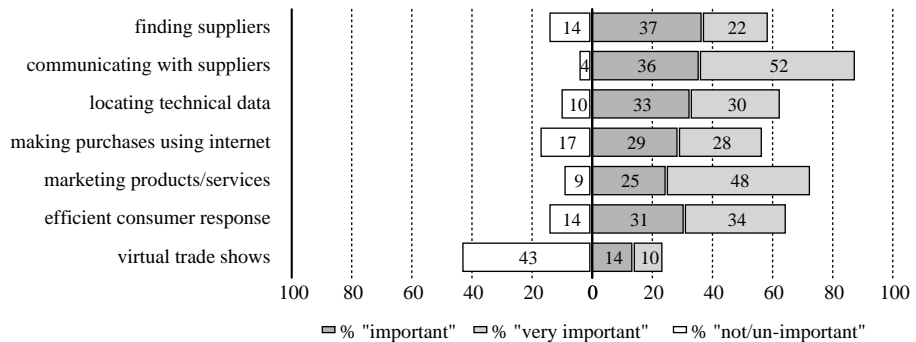


Figure 2.
Future perception of the importance of using web-based technology for purchasing and SM

Benefits of web-based technology

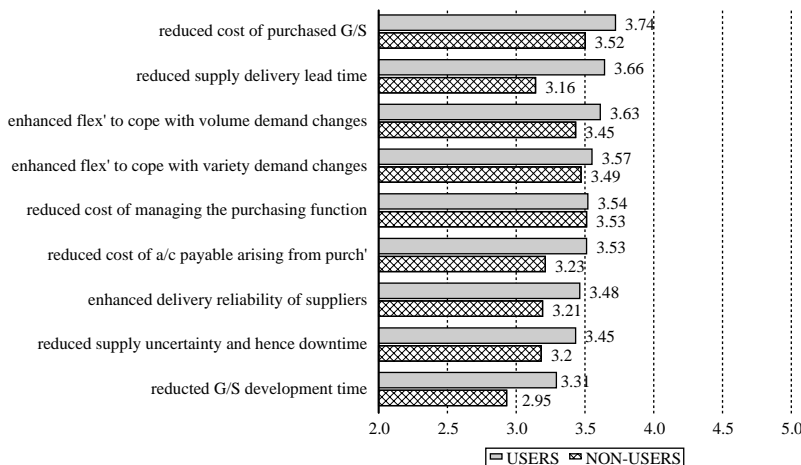
All participants were asked to indicate to what extent they believed nine proposed key benefits of using web-based technology for purchasing and SM were (if currently a user) or would be (if currently a non-user). The findings are shown in Figure 3.

For users of web-based technology, the three main benefits identified were: reduced cost of goods/services; reduced supply delivery leadtime, and enhanced flexibility to cope with changes in demand volume.

Non-users perception differed, placing more emphasis on reduced cost of managing the purchasing function; enhanced flexibility to cope with changes in demand variety, and perhaps most notably, much less emphasis on reduced supply delivery lead time. Thus, overall, the non-users outlook in terms of the benefits that might be derived from the implementation of web-based technology was much more focused on cost and flexibility improvements.

The relationship between the importance attached to the use of web-based technology for the seven purposes in our investigation and the perceived key benefits, was investigated using Pearson’s product-moment correlation coefficient. In this analysis we restricted the sample to the web-based technology users only. The results are presented in Table I. As can be seen, 18 strong positive correlations ($p < 0.01$) between combinations of “use”-“benefit” variables were observed. Examination of the Table indicates that in particular, the use of web-based technology for communicating with suppliers and for ECR is associated with:

- reduced supply delivery leadtime;
- enhanced delivery reliability of suppliers;
- reduced supply uncertainty, and hence downtime for the organisation;
- enhanced flexibility to cope with changes in demand volume for products/services; and
- enhanced flexibility to cope with changes in product/service variety demands.



2 = to a small extent ←-----→ to a very great extent = 5

Figure 3. Users and non-users views of the key benefits of using web-based technology for purchasing and SM)

Table I.
Correlation matrix
(web-based technology
users only) – importance
of web-based technology
usage and key benefits

Web-based technology uses	Reduced costs			Key benefits			Enhanced flexibility		
	of accounts payable arising from purchasing activities	Reduced supply lead time	Enhanced delivery reliability of suppliers	Reduced cost of managing the purchasing function	Reduced product/service development time	Reduced supply uncertainty, downtime	to cope with changes in demand volume	to cope with changes in demand variety	Reduced cost of purchased goods/services
Findings	Pearson	0.130	0.093	0.309**	0.209	0.222*	0.063	0.220*	0.237*
suppliers	Sig	0.276	0.386	0.003	0.052	0.039	0.563	0.041	0.027
	N =	87	88	88	87	87	87	87	87
Communicating with suppliers	Pearson	0.196	0.307**	0.210*	0.204	0.431**	0.407**	0.401**	0.081
	Sig	0.068	0.004	0.050	0.058	0.000	0.000	0.000	0.456
	N =	87	88	88	87	87	87	87	87
Locating technical data	Pearson	0.180	0.150	0.332**	0.153	0.344**	0.082	0.242*	0.257*
	Sig	0.095	0.162	0.002	0.157	0.001	0.448	0.024	0.016
	N =	87	88	88	87	87	87	87	87
Making purchases using the internet	Pearson	0.280**	0.231*	0.396**	0.117	0.275*	0.047	0.107	0.335**
	Sig	0.009	0.030	0.000	0.281	0.010	0.665	0.324	0.001
	N =	87	88	88	87	87	87	87	87
Marketing products/services	Pearson	0.189	0.266*	0.213*	0.082	0.271*	0.238*	0.226*	0.185
	Sig	0.082	0.013	0.049	0.453	0.012	0.028	0.038	0.090
	N =	86	86	86	85	85	85	85	85
Efficient consumer response	Pearson	0.192	0.354**	0.270	0.168	0.426**	0.352**	0.392**	0.254*
	Sig	0.075	0.001	0.011	0.121	0.000	0.001	0.000	0.017
	N =	87	88	88	87	87	87	87	87
Virtual trade shows	Pearson	0.144	0.097	0.163	0.024	0.122	0.221*	0.165	0.182
	Sig	0.185	0.374	0.132	0.829	0.264	0.041	0.129	0.093
	N =	87	87	87	86	86	86	86	86

Notes: *Correlation is significant at the 0.05 level (two-tailed); ** correlation is significant at the 0.01 level (two-tailed)

The use of web-based technology for making purchases over the internet was also strongly associated with reduced supplier delivery leadtime, as well as reduced costs of accounts payable arising from purchasing activities, reduced cost of managing the purchasing function, and reduced cost of purchased goods/services.

Web-based technology and buyer-supplier relationships

The final part of our analysis concerned the link between the use of web-based technology for purchasing and SM and firms' buyer-supplier relationship orientation. As mentioned earlier, it has been proposed that stronger buyer-supplier relationships develop when supply chain integration increases as a result of the deployment of such systems (Frohlich and Westbrook, 2001). Against this background, we posited the question, is use of web-based technology more prevalent in firms that have a proactive buyer-supplier relationship orientation than in firms that display a reactive buyer-supplier relationship orientation? We thus performed a χ^2 test for independence to explore the relationship between buyer-supplier relationship orientation and the use or non-use of web-based technology.

The procedure employed for dichotomising the respondent firms according to the buyer-supplier relationship orientation was as follows. Based on the participants' responses to 14 questions ascertaining the attributes of their relationship with their main suppliers, and using the buyer-supplier relationship typology proposed by McDonald (1999) and illustrated in Table II, the relationship emphasis for each firm in terms of partnership orientation, developmental orientation, monitoring orientation and traditional (adversarial) orientation was gauged. Firms were then assigned to one of two categories; those displaying a proactive relationship approach (that is, they displayed high relative emphasis on partnership or developmental orientation), or

Type of relationship	Characteristics
Traditional approach	Arms length relationship based on buyer specification of requirements with close monitoring at delivery stage to ensure that specifications are fulfilled. Poor performances are replace.
Monitoring approach	Arms length relationship with close monitoring of production and logistics process as well as the final product at delivery stage. Some help to solve problems that are identified in the production and logistical processes, but consistently poor performer are replaced.
Supplier development approach	Co-operative relationship with close involvement to help improve qualities in production and logistics processes. Information exchanges to help solve problems and to develop desired characteristics in the supply process. Less monitoring and more information sharing as compared to the monitoring approach, However, these relationships are not true partnerships because the buyer controls the working of the relationship.
Partnership approach	Co-operative relationship with very limited monitoring, considerable two-way information sharing, cooperation to solve problems, joint R&D and development work. Partnerships are based on a long-term commitment to cooperate to achieve mutually acceptable outcomes.

Source: McDonald (1999)

Table II.
Characteristics of
buyer-supplier
relationship orientation

those displaying a reactive relationship approach (that is, they displayed high-relative emphasis on monitoring or traditional orientation).

The test revealed no significant difference in web-based technology use on the basis of firms' buyer-supplier relationship orientation (Pearson's $\chi^2 = 1.96$, $p = 0.162$). Examination of the descriptive statistics indicated that the use of web-based technology was more prevalent in firms with a proactive buyer-supplier relationship orientation than in firms with a reactive orientation, but not to a significant level. Nevertheless, we were still interested to see if there was a relationship between buyer-supplier relationship orientation and the specific uses of web-based technology in our sub-sample of web-based technology users only. A χ^2 test for independence was therefore conducted for each of the seven uses of web-based technology against the proactive/reactive dichotomy. In six cases (that is, uses of web-based technology), the test revealed no significant difference in web-based technology use on the basis of relationship approach. However, the test did reveal a significant difference in terms of the use of web-based technology for making purchases over the internet (Pearson's $\chi^2 = 8.251$, $p = 0.004$). Examination of the descriptive statistics indicated that the use of web-based technology for making purchases over the internet was significantly more prevalent in firms with a proactive relationship orientation (67 per cent of them) than in firms with a reactive relationship orientation (only 32 per cent of them). Our findings therefore provide only limited evidence in support of the proposition that the deployment of web-based technology leads to stronger buyer-supplier relationships, or vice versa; and that the type of relationship adopted between buyer and supplier may lead to a more comprehensive use of web-based technology.

Summary and conclusions

To help to establish the strategic and operational importance of DWBT adoption to purchasing and SM, this paper reports the findings of an exploratory empirical study of UK firms. The study helps to fill a gap in the knowledge base by specifically focusing on examining the level of usage, the uses, the perceived benefits, and future perspective on the use of web-based technology in purchasing and SM. Moreover, it extends previous work by examining the link between web-based technology use in purchasing and SM and buyer-supplier relationship orientation. The findings of our research indicate that web-based technology is currently applied at both the upstream and downstream sides of the supply chain, with a marginally higher emphasis on the supply side. However, given the widespread availability and maturity of web-based technology the proportion of users discovered in this study appears to be quite low. The cost of such technology is relatively low and therefore unlikely to be a major inhibitor. It is possible that a lack of understanding of the potential of the technology and/or a lack of skill to exploit them are the main barrier faced. This may be a salient reason for our observation that the use of web-based technology was much less prevalent in SMEs, and concurs with the DTI's (2003) observation that many smaller businesses, without the scale for example to employ IT specialists, are less able to deploy web-based technologies in sophisticated ways that larger organisations do, and many are in fact "clicking off". A related possible explanation for the less prevalent use of web-based technologies in SMEs may be that as has been shown in previous research (Mudambi *et al.*, 2004), many SMEs do not exhibit a cooperative approach to purchasing relationships and nor do they have a formal purchasing strategy in place.

As such, web-based technology strategy is likely to be emergent rather than deliberate. The overall lower than expected usage finding is despite the fact that the sample reported perceived benefits of using web-based technology in purchasing and SM in terms of all basic supply related performance objectives, that is to say, cost, speed, flexibility and dependability. It is also important at this juncture to note that the level of use in our UK sample is not dissimilar to that reported by Min and Galle (2003) from the USA perspective. Furthermore, perceptions regarding the future importance of web-based technologies in purchasing and SM observed here show a very positive trend in their favour. As such, these findings do not indicate a major concern about overall return on investment from web-based technology deployment in purchasing and SM - a deviation from the DTI's (2003) suggestion that for ICT in general a perception of poor overall return on investment could be an overwhelming barrier to future investment.

Practical implications and limitations

It is important to note that none of the associations observed in this study prove causality. Nevertheless, the findings and associations point to some salient managerial implications. The evidence presented here, although based on management perceptions, provides a clear indication that the use of web-based technology in supply chain management activities is seen to have the potential to deliver operational performance improvements. For practising managers, a key question is where to apply web-based technology to bring about potential purchasing and SM related performance improvements. The findings from the examination of the relationship between web-based technology uses and key benefits (based solely on the views of the web-based technology users in our sample - Table I), suggests that performance can be enhanced through greater use of web-based technology for making purchases over the internet, and for ECR. Although, the reasons for the lower than expected deployment of web-based technology for these two purposes has not been investigated, it is possible that in the case of making purchases over the internet, concerns about the security of transactions or the availability of acceptable suppliers who provide this facility are limiting factors. Our analysis indicates that organisations already recognise and hence have implemented the use of web-based technology for communicating with suppliers – the third area that had greatest observed association with enhancing purchasing and supply related operational performance. The strong association between firms observed to emphasise a partnership or development relationship approach and the use of web-based technology for making purchases over the internet provides further support for the potential utility of web-based technology for this purpose. The following broad implication for policy makers is also evident from the study results – the need for a policy focus on helping SMEs (DTI, 2003) to overcome the challenges that they face in deploying web-based technologies in their purchasing and SM activities. An opportunity exists for large firms take a proactive stance in helping their smaller suppliers embrace web-based technologies (Min and Galle, 2003), initially perhaps for interaction and payment transfer, and hence be more likely to reap the full benefits of web-based technology in purchasing and SM themselves. The SMEs experience of using web-based technologies as a supplier to larger firms may then, in turn, encourage them to extend their use of web-based technologies as buyers.

Like other exploratory studies, this study has its limitations. The partially random sample of respondents was obtained from a single institutional database thus limiting the generalisability of the findings. Furthermore, the reported data are, unavoidably, based on management perceptions which may not fully reflect actual or expected practice. Finally, the main emphasis of this study relates to the use and perceived benefits of web-based technology in purchasing and SM rather than examining the performance impact of web-based technology on the various aspects of purchasing and SM. Any future research should consider a more in-depth approach. For example, it would have been beneficial to augment the quantitative data with qualitative in depth case studies to investigate the performance link. Whilst this paper has adopted a contingency perspective to examine potential causes underlying the web-technology usage statistics reported (firm size, firm type, and relationship orientation), and hence to establish a clear baseline on web-based technology use in purchasing and SM in the UK, future research should seek to extend these analyses through in depth qualitative approaches.

Note

1. hereafter referred to as web-based technologies for simplicity

References

- Amit, R. and Zott, C. (2001), "Value creation in e-business", *Strategic Management Journal*, Vol. 22 Nos 6/7, pp. 493-520.
- Archer, N. and Yuan, Y. (2000), "Managing business-to-business relationships throughout the e-commerce procurement life cycle", *Internet Research*, Vol. 10 No. 5, pp. 385-95.
- Au, K.F. and Ho, D.C.K. (2002), "Electronic commerce and supply chain management: value-adding service for clothing manufacturers", *Integrated Manufacturing Systems*, Vol. 13 No. 4, pp. 247-55.
- Boddy, D., Macbeth, D.K., Charles, M. and Fraser-Kraus, H. (1998), "Success and failure in implementing partnering", *European Journal of Purchasing & Supply Management*, Vol. 4, pp. 143-51.
- Boyer, K. and Olson, J.R. (2002), "Drivers of internet purchasing success", *Production and Operations Management*, Vol. 11 No. 4, pp. 180-98.
- Butler Group (1999), *IT Census 1999/2000 – IT usage, expenditure and staffing in the United Kingdom*, Butler Direct Limited, Hull, UK.
- Caputo, A.C., Cuechiella, F., Frawcchi, L., Pelegagge, P.M. and Scacchia, F. (2004), "Analysis and evaluation of e-supply chain performances", *Industrial Management & Data Systems*, Vol. 104 No. 7, pp. 546-57.
- Croom, S. (2005), "The impact of e-business on supply chain management: an empirical study of key developments", *International Journal of Operations & Production Management*, Vol. 25 No. 1, pp. 55-73.
- DTI (2003), "Business in the information age: international benchmarking study 2003", available at: www2.bah.com/dti2003/index.htm
- Frohlich, M.T. and Westbrook, R. (2001), "Arcs of integration: an empirical study of supply chain strategies", *Journal of Operations Management*, Vol. 19 No. 2, pp. 185-200.
- Geary, S. and Zonnenberg, J.P. (2000), "What it means to be best in class", *Supply Chain Management Review*, July/August, pp. 43-8.

- Giaglis, G.M. (1999), "Assessing the impact of electronic commerce on business performance", *Electronic Markets*, Vol. 9 Nos 1/2, pp. 25-31.
- Harland, C.M., Lamming, R.C. and Cousins, P. (1999), "Developing the concept of supply strategy", *International Journal of Operations & Production Management*, Vol. 19 No. 7, pp. 650-73.
- Hoyt, J. and Huq, F. (2000), "From arms-length to collaborative relationships in the supply chain: an evolutionary process", *International Journal of Physical Distribution & Logistics Management*, Vol. 30 No. 9, pp. 750-64.
- Iacovou, C.L., Benbasat, I. and Dexter, A.S. (1995), "Electronic data interchange and small organizations: adoption and impact of technology", *MIS Quarterly*, Vol. 19 No. 4, pp. 465-85.
- Insigna, R.C. (2001), "A methodology for evaluating the viability of e-businesses", in Proceedings of the Strategic Management Society Annual Conference, San Francisco.
- Johnson, M. and Whang, S. (2002), "E-business and supply chain management: an overview and framework", *Production and Operations Management*, Vol. 11 No. 4, pp. 413-23.
- Kehoe, D.F. and Boughton, N.J. (2001), "New paradigms in planning and control across manufacturing supply chains", Vol. 21 Nos 5/6, pp. 582-93.
- Lancioni, R., Schau, H.J. and Smith, M.F. (2003), "Internet impacts on supply chain management", *Industrial Marketing Management*, Vol. 32 No. 3, pp. 173-5.
- McDonald, F. (1999), "The importance of power in partnership relationships", *Journal of General Management*, Vol. 25 No. 10, pp. 43-59.
- McIvor, R., Humphreys, P. and Huang, G. (2000), "Electronic commerce: re-engineering the buyer-supplier interface", *Business Process Management Journal*, Vol. 6 No. 2, pp. 122-38.
- Min, H. and Galle, W.P. (1999), "Electronic commerce usage in business-to-business purchasing", *International Journal of Operations & Production Management*, Vol. 19 Nos 9-10, pp. 909-21.
- Min, H. and Galle, W.P. (2001), "Electronic commerce-based purchasing: a survey on the perceptual differences between large and small organisations", *International Journal of Logistics: Research and Applications*, Vol. 4 No. 1, pp. 79-95.
- Min, H. and Galle, W.P. (2003), "E-purchasing: profiles of adopters and nonadopters", *Industrial Marketing Management*, Vol. 32 No. 3, pp. 227-33.
- Mudambi, R., Schunder, C.P. and Mongar, A. (2004), "How co-operative is co-operative purchasing in smaller firms? Evidence from UK engineering SMEs", *Long Range Planning*, Vol. 37 No. 1, pp. 85-102.
- Roberts, B. and Mackay, M. (1998), "IT supporting supplier relationships: the role of electronic commerce", *European Journal of Purchasing & Supply Management*, Vol. 4 Nos 2/3, pp. 175-84.
- Tang, J.E., Shee, D.Y. and Tang, T-I. (2001), "A conceptual model for interactive buyer-supplier relationship in electronic commerce", *International Journal of Information Management*, Vol. 21 No. 1, pp. 49-68.
- Turban, E., King, D., Lee, J. and Chung, H. (2002), *Electronic Commerce: A Managerial Perspective*, Prentice-Hall, Upper Saddle River, NJ.

About the authors

David Gallear is Senior Lecturer in Operations Management at Brunel Business School. His research interests include operations strategy, quality management and supply chain

JMTM
19,3

management. Current work focuses on examining the nature, form and determinants of supply chain purchasing strategy relationships. David Gallear is the corresponding author and can be contacted at: david.gallear@brunel.ac.uk

Abby Ghobadian moved to Henley as Director of School of Projects, Processes and Systems on the first of January 2007 from Brunel University Business School where he was Professor of Management. His research interests lie in examining the reasons for heterogeneous organisational performance and how organisational performance can be improved.

Nicholas O'Regan is a Professor of Strategy/Enterprise and Innovation at Bristol Business School, University of West of England. His research interests include the organisational culture, leadership and the strategic planning processes of small- and medium-sized organisations.

360

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

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