



A classification and selection model of e-marketplaces for better alignment of supply chains

Classification and selection of e-marketplaces

483

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Abstract

Purpose – To provide a contingent framework for the classification and selection of e-marketplaces has been developed.

Design/methodology/approach – The framework is developed from a review of relevant literature and examined through conducting case studies, two of which are reported in the paper.

Findings – A number of e-business classification models are proposed. The key model dimensions considered are the nature of the products/services to be traded, the ownership/formation of the marketplace and the level of functionality/relationships exhibited by the trading exchange. The strategic role of an e-marketplace is also identified as being dynamic in nature over the product/market lifecycle and the ongoing development of information systems and technologies.

Research limitations/implications – The paper considers the power, relationship and behavioural aspects associated with the formation of e-marketplaces but this is not the specific focus of the work undertaken.

Practical implications – The cases demonstrated that supporting future products customisation strategies using e-marketplaces appeared to be only possible if sufficient confidence and expertise is developed within the companies and their supply chain, and also the fear of disruption and disintegration of the chain is overcome.

Originality/value – The paper combines a strategically important concept with empirical and practical considerations.

Keywords Electronic commerce, Supply chain management

Paper type Conceptual paper

Introduction

With the worldwide explosion of information technologies e-marketplaces are vastly expanding to replace the traditional markets in the expectation of supporting and improving supply chains. Thanks to these new approaches, which are also referred to as virtual marketplaces (Love and Tellefsen, 2003), the once idealistic business models such as virtual enterprises are now being materialized, and vertical markets are becoming a web of supply-demand relationships.

The idea of the universal integration of organisational contents, back office processes and front-end web interfaces used to move transactions between supply chain partners has recently been strongly advocated. There are two reasons for this, first the proliferation of affordable technology that has allowed the SMEs to participate in e-marketplaces, and second the explosive growth of the business-to-business (B2B) electronics transactions projected over the next few years.

The potential of internet in offering benefits to its users, which is now seen potentially producing more than \$1 trillion savings from the worldwide annual spend



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of \$7 trillion on components, supplies and services (Jones, 2000), has turned it into a priority issue in many industries today. Industry analysts predict that B2B online sales will grow at a pace ten times faster than consumer-based revenues. A report by the Forrester research group indicates that by 2004 the development of B2B e-marketplaces and portals including auctions, aggregators, bid systems and exchanges will represent 53 per cent of online business trade to account for 8.6 per cent of the worldwide sales of goods and services. Gartner Group predicts that online trading will hit \$7 trillion by 2004, with approximately 40 per cent of the transactions occurring through e-marketplaces. The Forrester report has also projected that e-marketplaces could capture between 45 and 74 per cent of the electronic supply chain by 2004. This represents a major shift from traditional B2B e-commerce. Trading relationships are shifting from one-to-one to many-to-many scale (Anonymous, 2001). The overall message of these figures is that a huge potential exists for the growth of B2B marketplaces and that this type of electronic commerce will be the centre of world business transactions.

US Department of Commerce Figures ([www/current.html](http://www.current.html)">www.census.gov/mrts/www/current.html, 2003), based on a random sample of 11,000 retailers, show that online retail sales in the US totaled about \$28 billion in 2000 (0.9 per cent of total retail sales), \$35 billion in 2001 (1.1 per cent of total retail sales and an increase of 22 per cent over the previous year, despite the softening economy and the shock of the September 11 terrorist attacks), and \$43 billion in 2002 (1.3 per cent of the total and an increase of 26 per cent over the previous year). It is expected that by 2005, e-marketplaces will be involved in 25 per cent of all B2B-only transactions.

While the internet provides a low-cost network for B2B transactions, the benefits of the internet and e-commerce go far beyond cost reduction (Boyle and Alwitt, 1999). In essence, the internet allows supply chains to decrease friction within their chains, improve output, and enhance overall satisfaction at every node of the network (Deeter-Schmelz *et al.*, 2001). Electronic customer relationship management (eCRM) is the latest technique companies are using to increase and enhance their marketing skills and capabilities (Scullin *et al.*, 2004).

The benefits expected from participating in e-marketplaces are wide and exciting. For purchasers they can provide a state of increased negotiating power, via the introduction of additional suppliers, aggregated buying and the creation of virtual auctions, as well as additional benefits in terms of efficiencies in product availability, delivery and inventory management. Simultaneous transactions can also prove far easier, via a convenient single point of contact for all parties, and this can help with faster times to market, and improved access to surplus supplies and spot purchases. Suppliers would find marketplaces attractive because they could easily and cost effectively reach new customers (White and Daniel, 2004). For suppliers they provide greater exposure to larger buying communities, with improved reach, range and efficiency, the potential for increased transaction volume, and a level playing field of competition.

The internet is believed to prove significant impact upon the competitiveness of demand networks. These networks would provide an opportunity for mutually complementary action in pursuit of a common goal (Cunningham and Calligan, 1991). Acknowledging individual customer needs within the supply-chain activities can provide the capability for customisation of products, and hence serving customers with "end-to-end" customer support that extends from the initial contact through the entire

purchasing cycle of order-taking, delivery, and after-sales service (Singh, 2002). The following benefits of using e-marketplaces are identified and summarised by Digital Union (2001):

- (1) Cost reductions at various levels such as:
 - cost of the purchased items through better negotiations, stronger competition, improved overall control; and
 - procurement transaction and administrative costs.
- (2) Reduced procurement cycle times:
 - lower transaction processing time;
 - less manual error in inputting orders; and
 - lower delivery lead times, including improvements in just-in-time deliveries.
- (3) Added value at several levels in the procurement process:
 - improved management information and strategic insights through detailed analysis of the suppliers' performance and of the company's buying patterns;
 - improved internal and external workflows;
 - improved collaboration between suppliers and buyers sharing performance measurement data;
 - more accurate deliveries through reduction in processing errors; and
 - reduced inventories through better demand management.
- (4) Potential for revenue growth and market share expansion through improved competitive advantages and opportunities to:
 - find new partners or better sources for supplies;
 - implement new procurement methods such as reverse auctions; and
 - get to market earlier and faster.

There is, however, a number of considerations with regard to the potential limitations and barriers for participating in e-marketplace. Strategic considerations are among the key inhibitors, as some of the methods deployed in e-marketplace transactions such as reverse auctions are perceived to potentially damage long-term supplier relationships (White and Daniel, 2004). For instance, the perception that reverse auctions, as a widely applied method, achieve reduced prices to the loss of quality and perhaps total cost has become a concern among industries and practitioners.

E-commerce has the potential to revolutionise the way a business is run and thereby redefine the concept of work, marketplace and society. To understand various aspects of e-commerce and its impacts we need to (Brunn *et al.*, 2002):

- comprehend the philosophy behind the organisation;
- understand the role of information and communication for the organisation;
- identify technologies necessary for establishing communication;
- determine technical and organizational issues; and
- identify the consequences of e-commerce.

Businesses facing the challenge of transforming in the digital economy must be able to understand the disruptive nature of e-commerce (Bower and Christensen, 1995). Disruptive technologies are those that initially tend to degrade performance but promise greater long-term potential (Bower and Christensen, 1995). Most current e-commerce practices cannot match the traditional business models in some key performance attributes, such as privacy and security in business-to-consumer (B2C) commerce, and the robustness and capacity of the dedicated electronic data interchange system in B2B commerce (Chung-Shing Lee, 2001). However, there are streams of technological innovations to improve these key performance attributes for the disruptive technology.

A major consideration will arise when it comes to adopting the right e-marketplace method and mechanism for a particular product or service. For example, the suitability of products and commodities for the application of reverse auctions has recently received considerable attention. Also operational issues could act to hinder the deployment of the practice to its full capacity.

It could, therefore, be argued that in the approach to creating the emerging communities of e-marketplaces the rules of business should not get suspended, and a careful decision should be made whether to form, join or refrain from e-marketplaces. Clearly, entering the e-marketplace requires thorough assessment, strategic thinking, careful planning and sound implementation.

In a critical review of the internet phenomenon Porter (2001) suggested that internet technology should be considered only as an enabler to be used wisely rather than not. Calling for discounting the experiences and lessons learned so far from the early application of this technology he invites a cautious approach to e-business in order to prevent side effects such as reducing the abilities of companies to establish operational advantage.

Although in practice e-marketplaces are fundamentally the e-enabled version of sales and purchasing operations, the experiences from the relatively short history of this new phenomenon have provided grounds to believe that e-marketplaces should be positioned at a strategic level, comparable to the whole concept of supply chain management (Damanpour, 2001). Also e-marketplace as a result of application of ICT can be considered to have disruptive effects on the operation of supply chains. The probable impact of the disruption caused by e-marketplaces should therefore be studied and the matter of supply/demand networks alignment and management be examined considering the emergence of this phenomenon.

A research project has been initiated to address the need for a structured framework for approaching e-marketplaces. In practice the key questions to be answered include whether to create an exchange, be a participant of an exchange, or both, and consequently determining how a company should operate its environment, what processes/services it will support, and what technology it should implement are among major considerations of the project. However, before creating or joining an e-marketplace, a company should decide how e-marketplace participation fits into its business plan, and understand what effect it will have on the company and its supply chain. For this purpose this research work tends to consider the e-marketplace concept and practice as comparable to operations of demand networks, where a whole network could be brought together to serve the market in an integrated manner.

The research has been carried out with reference to previous work by authors in the area of demand network alignment (DNA) (Kehoe *et al.*, 2001, 2002; Sharifi *et al.*, 2002).

The DNA work, which is a methodology for the design, alignment and management of supply chains, is based on a classification method for supply chains. The proposed classification, which essentially considers the market as the main element to which the supply chain should be aligned, defines three main market related external factors as the determinants of the structure, characteristics and operations of a supply chain. In this research, reference will be made to the supply chain classification proposed in the DNA model to suggest a method for classifying supply chains with relation to e-marketplace concept and practice. Determining the right model, approach and technique to adopt for different supply chains, products and markets is the major objective of the proposed classification.

In the previous research programme, referred to in the above section, and through case studies carried out in UK industrial sectors models of the interactions of the demand networks operations' variables and their alignment issues have been proposed and tested. These models have been combined into a DNA like representation of an intermeshing network of two strands, namely the physical/operational strand and the relationship/behaviour strand, each contributing to the quality of the supply and demand network system. The alignment of the physical/information system is modelled as a continuously evolving DNA strand. Similarly another equally important strand is suggested in the proposal which represents how interpersonal and inter-organisational relationships interact with the physical structure of the supply chain.

According to the DNA interpretation of supply chain management the adoption of e-marketplace strategy, as a disruptive technology, would impact the strategic and operational alignment of the supply chain, as well as the relationships and behaviour patterns within the chain. To understand the probable effects of the new emerging business models stemming from the application of new ICT the DNA model can be employed to investigate the problem. With this approach the effects of the application of e-marketplaces on the supply chain alignment could be studied and the e-marketplace as a technology based business model could be interpreted in a fashion similar to the DNA model assisting better understanding and management of e-marketplaces.

An essential step towards successful adoption of e-marketplace is to understand and position the supply chain and select the appropriate model and approach. The medium for this selection is set forward similar to the DNA model through development of a classification model.

DNA of e-marketplaces

The research views the e-marketplace phenomenon as follows:

- (1) E-marketplaces are the product of strategic application of new information technology to the traditional marketing, market operations and supply chain operations. This is particularly true in terms of the integration capabilities this new approach has brought about.
- (2) E-marketplaces correspond strategically with the market, product and supply chain strategies. As a result while it is the company, corporate and supply chain strategies that determine the e-marketplaces strategies, they can receive fundamental impact from the concept of e-marketplace leading into substantial changes in principles. By offering new strategic benefits in terms of cost, time,

logistics, and customer/supplier management e-marketplaces are proving to be capable of introducing new dimensions to the approaches to the strategy determination.

- (3) E-marketplaces are mediums by which the balance of power within supply chains could be manipulated and changed. Reliance on certain suppliers or buyers could be shifted to aggregate bargaining power over them by resorting to new methods of purchasing and sales via e-marketplaces.
- (4) E-marketplace as a technological approach to market operations is an effective medium to improve the relationship between the network's members and to bring about the benefits from closer and integrated relationships in the supply chain by providing new opportunities for:
 - Integration of companies in a demand network and their operations including market demand determination, order management, operations synchronisation, logistics operations, etc.
 - Defining and managing communication channels more effectively.
 - Impacting the possibility or intensity of psychological games within the networks by providing more transparency to the actions and moves of the players.

The study of the e-marketplace phenomenon under the influence of the previous DNA model has led to the introduction of a parallel version of the DNA model for e-marketplace which comprises two intertwined strands, defining the existence and characteristics of the e-marketplace and representing its evolving nature. The physical strand addresses the process of formation of the e-marketplace, determination of the e-marketplace and network strategy, and planning and management of its operations within the context of supply chain management including the communication models and patterns. This strand considers issues such as:

- How e-marketplaces shape the processes and operations of the supply chain.
- How supply chain members could achieve joint sustainable competitive advantages by using the e-marketplace.
- How firms and members of supply chain would incorporate the emerging technologies of e-marketplaces into their boundaries, and whether these boundaries should be redefined as a result.
- How companies could define the nature of future activities with supply chain members by approaching the concept of e-marketplaces.

The relationship strand, as in the DNA model, represents the initial power balance when the e-marketplace is established. The power issue is basically determined by the ownership model/factor of the e-marketplace and the overall power balance of the supply chain which leads to the development of certain types of relationships. This situation will then generate the communication patterns and finally probable psychological games between the network members affecting the operations and performance of the supply chain. The two strands of the model also interact and create a two way influence of one on the other. Figure 1 shows the e-marketplace DNA model.

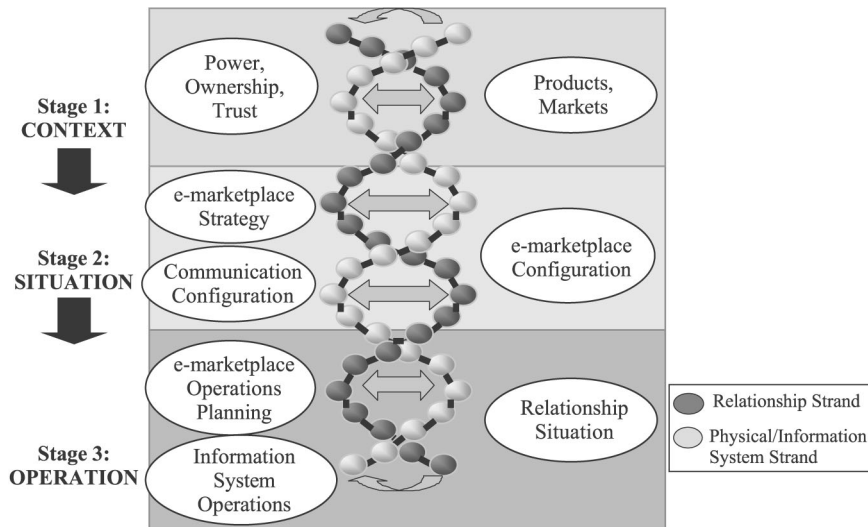


Figure 1.
DNA model for e-marketplace

The reference DNA model determines the formation of the supply chain based on a thorough analysis of the market/marketplace through an initial classification of the supply chain. A similar logic is devised to interpret the adoption of e-marketplace strategy for a supply chain and therefore a classification model is developed and introduced in the following section. The purpose of the classification model is to identify the position of the company and its supply chain within the market and business structure, and to answer the question of: “what is the appropriate e-marketplace, if any at all, for a particular supply chain and its members?”

Classification of e-marketplaces

A classification method is needed to understand and position a supply chain or a firm in terms of the application of e-marketplaces. This will assist the supply chain in evaluating the strategic position of the e-marketplace in their business, defining the proper criteria, and making decisions on what, where, when and how to utilise this new approach.

The task of effectively classifying B2B e-marketplaces can be a very complex process. The specific functionality and requirements expected from any electronic marketplace by its supply chain can be extremely varied even within a single market. It can be product driven or functionality driven, as opposed to market driven. In other instances the requirements are driven exclusively by the potential business benefits, regardless of what products are involved.

Although a specific set of functions, including catalogue searching, information exchange and auctioning lie at the forefront of many typical e-marketplaces, the combination of features and the purpose for which they are incorporated can vary significantly. Different activities at different stages along the supply chain also lend themselves to becoming electronic interactions to greatly differing extents.

A standardisation of e-marketplace characteristics could be possible if the underlying objectives and potential benefits for the inception of these marketplaces are examined. E-marketplaces, in broad terms, provide an electronic means to simplify,

automate, and help synchronise the way in which supply chain partners interact with each other to reduce costs, improve productivity and increase revenues. In addition to this, e-marketplaces aim to bring about a state of increased transparency between supply chain partners, in terms of demand and availability, creating a reduction in lead-times, inventory, and work in progress, all resulting in strategic benefits.

However, no two e-marketplaces operate in exactly the same manner, and it would be impractical to create a blueprint to which all e-marketplaces should adhere to in order to attain success. A reasonable first step, however, towards a classification would be to decide upon which particular characteristics of these e-marketplaces offer sufficiently enough distinctive divisions as to justify a classification category.

In approaching e-marketplaces as a strategic step, many companies are concerned and therefore spend a great deal of time for deciding on whether to enter this business and if yes what model or approach would most suit their business. While the importance of adopting the right approach is already highlighted by some workers (Chopra and Mieghe, 2000; Smeltzer and Carter, 2001), the main focus of the research so far in this area has been technologies and tools for this purpose, and as a result not many examined frameworks for guiding organisations through this decision-making process are proposed. However, a few categorisation or classification of e-marketplace elements are suggested including channels of e-marketplaces (Morgan Stanley Dean Witter, 2000), tools for conducting electronic B2B trade (Kaplan and Sawhney, 2000), and type of purchasing and items (Hasen *et al.*, 2001). Witekar *et al.* (2001) and Temkin (2001) support a two-dimensional classification of B2B e-marketplaces including the connectivity model concerning the ownership of the marketplace, and application model concerning involved processes, the objectives of the marketplace and used tools. Two main typologies are also advocated by Bartzaghi and Ronchi (2003) which include sourcing service providers who host the e-marketplace operations for various customers, and sourcing process outsourcers who additionally provide professional services such as analysis of the market and contract and negotiation processes to customers.

This research has identified a set of three key characteristics to provide the basis for a classification model of e-marketplaces. The characteristics are ownership/structure, product/market type, and required functionality. Three classification models are then derived using these three dimensions which will assist in determining the position of an industry, an e-marketplace or a product/market. The classification models will be incorporated in the DNA model for e-marketplaces as a support for the design and management of the e-marketplace. A series of comparisons between e-marketplaces in three different industries are also presented as the result of applying the models.

Ownership and structure

In terms of ownership, e-marketplaces can be adequately categorised as being one of three main types; independent, sector coalition and private. The main distinguishing characteristic between these three types of e-marketplaces is the level of control applied by the participants. The three types are distinguished as follows.

Independent (vendor led). Owned and managed by a neutral third party, usually that of a software/hardware vendor, who acts as a systems provider, bringing together a collection of buyers and sellers from a particular industry or geographic location, and offering them the means by which to transact electronically – thus creating exchanges for like-minded buyers and sellers.

Drawbacks usually associated with these “Net Markets” are their tendency to focus only on a single market, poor support for global strategies, and the inability to link up successfully with legacy systems. With so much invested in existing legacy systems, particularly amongst larger companies, it would be an unattractive proposition for many supply chains to move into areas where the benefits of this information would be rendered useless.

Sector coalitions (sector led). Typified by joint ventures such as Covisint and Exostar, these e-marketplaces are comprised of groups of companies that come together to form their own exchanges for mutual gains. These marketplaces are generally “buy-side” and consist of bricks-and-mortar players forming consortia to set up e-marketplaces.

The partnerships are designed to expand the e-procurement toolset of its members, enabling them to source their products and services via a common channel. This aggregated purchasing, and software standardisation, is seen as an important mechanism in reducing costs, improving productivity, reducing inventory, and increasing profit margins for the partners involved.

The participants have limited control over the operations and policies of the e-marketplace and have to abide by the rules and regulations set in place by the central governing body.

Private marketplaces (enterprise led). These are environments where suppliers of products and services are invited to compete/participate in the electronic trading process of satisfying the demands of a solitary customer. The enterprise sets and defines its governing rules and regulations and holds the entire control over the marketplace activities. This type of e-marketplace usually involves a big industry player providing the electronic infrastructure to connect all its own supply chain trading partners, stirring up significant interest in the rest of the market, with many companies striving to become “members” due to the sheer scale of potential benefits on offer to participants. Many, on the other hand, often feel pressurised into joining and remain apprehensive as to the extent of commitment required and the possibility of being “locked-in” to a marketplace where they feel they have little or no control.

With typically one-to-one, or one-to-few, relationships between the company and its suppliers, these private marketplaces avoid many of the pitfalls surrounding larger scale public exchanges, and consequently much growth has been experienced in this area with fewer concerns over privacy and cannibalisation.

A good example of a private e-marketplace is the one operated by the Volkswagen Group. They already manage nearly all their procurement volume, of more than €50 billion, via the internet (www.vwgroupsupply.com, 2004). Analysts saw this alliance with SupplyOn as a direct challenge to Covisint, who had previously attempted to woo both Volkswagen and BMW to join its own founders, Daimler-Chrysler, Ford, and General Motors. However, at the time, both preferred to build their own private exchanges (Masood, 2001).

Products and services

Typical products and services currently traded via e-marketplaces exchanges, using auctions and cataloguing, include raw materials, commodities, surplus produce, maintenance, repair and operational (MRO) products, transportation, and design and maintenance services.

Reference has been made in the past to e-marketplaces only truly being effective in purchasing terms for trading in non-critical items. Findings from studies carried out in the automotive industry, however, are contrary to this and justify the use of electronic trade for any item regardless of its complexity or uniqueness as long as there are business benefits to be made over the traditional means in e-enabling the process (Jap, 2003; Harman and Tribiahn, 2001). As a certain amount of control over the running of the e-marketplace is required to successfully achieve this purpose, it is likely that it applies primarily to private e-marketplaces and certain sector coalitions.

Typical services procured via e-marketplaces can range from transportation, contract cleaning, plant maintenance and logistics services, to intricate design and collaborative supply chain planning. Design is indeed an area that has experienced great change since the advent of the internet, with teams of designers across the world now able to work on and collaborate on the same documents at the same time. This service, therefore, translates well and lends itself perfectly to e-marketplaces though close relationships between the collaborators are a necessity. E-marketplaces have also been used, to a significant extent in most markets, to strategically source new suppliers and customers that would typically lie outside the range, geographically or otherwise, of their traditional trading channels.

A number of different perspectives can be taken in the way the type of products and services for procuring using e-marketplaces are classified. The product can be simply defined as a commodity or in terms of whether the product specification has been designed. The complexity of the product in terms of technological and manufacturing features can be another differentiator although it can be considered as being predicated in the former classification. The nature of the market for the product in terms of price and brand sensitivity, and the availability of capable suppliers can also influence the way the products are classified. Also the stage in the product cycle for production parts, whether it is in initial stage of product development or it is an existing product for which the items are re-sourced, can be used to classify the products in terms of the e-marketplace appropriateness.

Functionality

Functionality demands of e-marketplaces, on the whole, are for the existence of a platform whereby supply chain partners can buy, sell, auction, reverse auction, track, connect, integrate, collaborate and manage (electronic) payments, in a secure environment.

According to AMR Research, the top ten capabilities required of online trading exchanges are: order status/tracking, product search, product catalogue, vendor search, back-end integration, supplier/buyer rating, request for proposal/quotation, transportation management, integration to other exchanges, and collaborative planning (buyer/seller).

Most e-marketplaces in operation today include any number of configurations and combinations of this set of core features. Although the way in which they are employed, and to what extent, can vary greatly. The basis on which the functionalities of e-marketplaces can be classified is the level of relationship that a particular functionality is associated with. The range of functionalities from exchange of information to anonymous auction to digital catalogues and up to collaborative design could be set on a continuum of anonymous (buyer-seller matching) to close relationship (value chain collaboration) and even to full integration of the supply chain.

Classification models

Three classification models of e-marketplaces, generated from the three dimensions outlined are proposed. The models demonstrate the relationship between each of the dimensions with the other two dimensions, and indicate the areas where a more suitable match exists in the interaction between the dimensions. The classifications are primarily based on two main factors which are the level of control of the players, and the level of relationship within the e-marketplace.

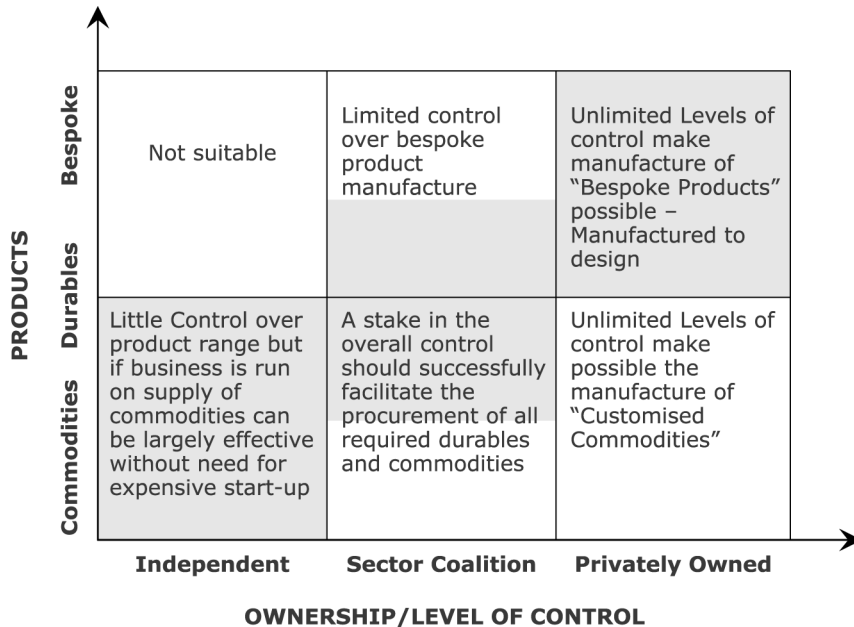
The research also considers the proposed classifications as a dynamic situation in which the taxonomy will evolve due to a number of factors such as changes in technology, global business circumstances and further expansion of internet applications. The models are briefly characterised as follows.

Model one: products/services versus ownership

The products/services dimension is based on the level of complexity of the products/services and also how well defined they are. Commodities such as catalogue items lie at the most defined and simple end of the scale followed by durables, tailor-made items, manufactured-to-design, and finally bespoke products encompassing the least defined and complex product type.

The product scale is plotted against the level of e-marketplace ownership and control, and shown in Figure 2.

Independent, vendor-led, marketplaces, where the participants have either little or no control over operation of the exchange, are well suited to the trade of standard items but as the level of complexity of the items increases the independent e-marketplaces



Note: Grey areas indicate better match

Figure 2.
Classification model 1

become less suitable. This is due mainly to the “one solution fits all” approach not being designed around specific needs and not being flexible enough to accommodate the levels of collaboration required in the manufacture-to-design process.

Private e-marketplaces, on the other hand, are very well suited to the manufacture of bespoke products due to their single point of control. By definition, private e-marketplaces are based around the sole requirements of a single company, so tailoring the products they procure to an exact design specification is very much part of the reason for their creation.

Somewhere in between are the sector coalitions, having a compromised level of control over the operation of the exchanges they are in, but not in a sole decision-making position, as found with private marketplaces. Commodities and durables are traded quite freely within sector coalitions, but attempts at bespoke procurement and manufacture are susceptible to certain restrictions.

Model two: products/services versus functionality

In order to classify scalable levels of functionality for an e-marketplace a dynamic taxonomy is suggested in terms of the strength of relationship exhibited between supply chain partners against an increasing level of functionality as shown in Figure 3.

For instance, an anonymous relationship is sufficient for companies only needing to search product catalogues and participate in auctions particularly for purchasing commodities, whereas at the opposite end of the scale much closer relationships are required for collaborative design and supply chain planning. In the middle sit other services such as logistics, tracking and maintenance, where a certain amount of co-operation is required between the trading partners.

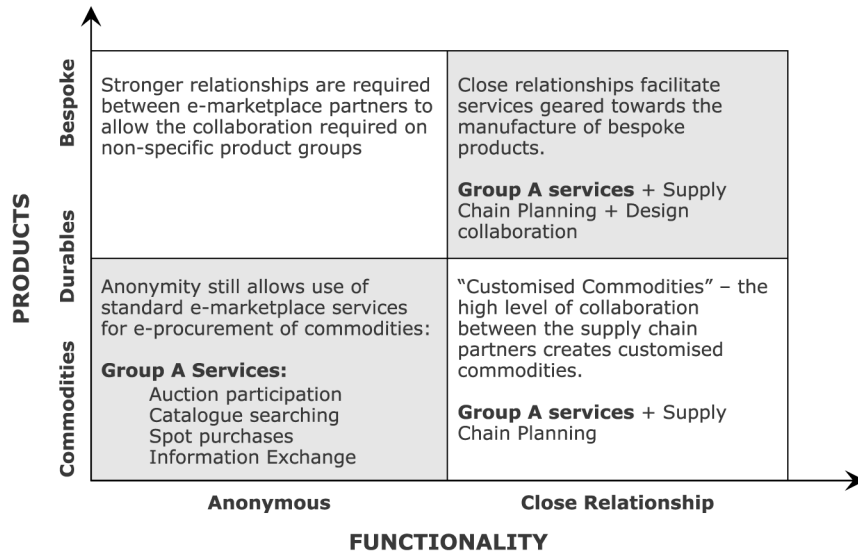


Figure 3.
Classification model 2

Note: Grey areas indicate better match

Model three: functionality versus ownership

A comparison of ownership against functionality is shown in Figure 4. As shown in the figure the best results for an independent e-marketplace are likely to be experienced in the anonymous functionality region where standard catalogue searching, auctioning, and spot purchasing are all applied satisfactorily. The type of relationships found here can be best described as a series of many-to-many relationship. The widest variety of relationships in e-marketplaces can be found within sector coalitions, where in the beginning most partners involve their own suppliers within the e-marketplace leading to a network of few-to-many relationships. Standard functionality should work better in these instances. However, for collaborative design and supply chains planning, additional efforts are required outside the e-marketplace environment.

Privately-owned marketplaces, with their one-to-many relationships geared towards increasing the return on investment of a single company, are effectively suited to whatever trading of products and services is desired by that particular company at any particular time. If, however, close collaboration is not a core requirement of that company, sufficient functionality could probably be found by joining a public e-marketplace without undertaking the high risk and investment involved in starting up their own electronic exchange.

Figure 5 shows a series of examples of e-marketplaces that are currently in operation, the companies who are subscribing to their membership, typical products traded, and where the balance of power, in terms of ownership, lies in each case.

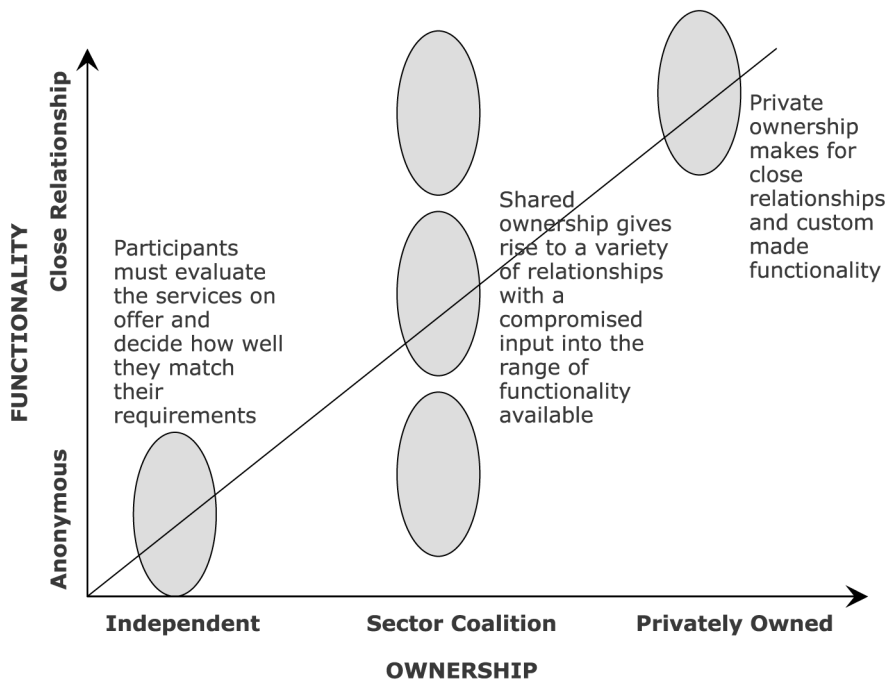


Figure 4.
Classification model 3,
ownership vs functionality

e-Marketplace	Ownership	Products	Functionality
Agribuys.com ifoodspace.com foodmarketexchange.com	Independent	Food products MRO Products <i>(Motors, Furniture, stationary etc..)</i> Non-Key Ingredients Contract Services <i>(Transportation, Maintenance, etc...)</i>	Auction, Reverse-Auction, Exchange
Covisint	Sector Coalition (Ford, GM, Daimler-Chrysler, Nissan, Peugeot, Renault)	Raw materials Services Critical & Non-Critical items Sourcing New Suppliers	Connect Data messaging service providing a single connection for a company's computers to exchange data with the computers of its partners. Communicate Communicate Portal enables industry participants to access OEM applications, supplier applications and Covisint applications via one common infrastructure. Collaborate Auction tool, problem solver, Third Party Applications, Trading Partner Network, and training programs
Exostar	Sector Coalition (Bae Systems, Boeing, Lockheed Martin, Raytheon, Rolls-Royce)	Raw materials Services Critical & Non-Critical items Sourcing New Suppliers	Capability to initiate, accept and plan orders through a single Internet application. Participate/originate auctions. E-Procurement via Exostar's network of suppliers. Collaborative design tool, integration adaptor, electronic cataloging
VWGroupSupply.com	Private Volkswagen	60% of all vehicle parts procured Serial parts	Online Catalogs Online Inquiries Online Negotiations Capacity Management

Figure 5.
Typical e-marketplace characteristics across three different industries

Case study

In order to evaluate the proposed models an investigation was carried out using a case study method. As a first step in the study secondary data from a number of cases were reviewed including those described in previous sections. Two leading manufacturing companies utilising e-marketplace functionality were then analysed with reference to the proposed models. The study was aimed at investigating the approach of the case companies towards implementation of electronic marketplace operations and integrating them in their business processes. In particular, the research attempted to verify the status of e-marketplace operation within the case companies with regard to the issues such as:

- the strategy of the company for moving to electronic marketplaces;
- the company's e-marketplace choice location with reference to the three proposed classification frames; and
- the company's experience from being in the e-marketplace with regard to strategies and operations, and its impact on the company's operations and its supply chain alignment.

The cases were studied through conducting interviews with senior executives of the companies, results of which are reported in the following.

Case one

This case study relates to a UK traditional carmaker which has become a leading user of e-marketplace innovative practices. The study is based on interviews at the company with focus on the reverse auction as one of the main e-procurement methods. The company started approaching the technique in late 2000 leading to 47 reverse auctions in 2001 accounting for somewhere between one and 10 per cent of its purchasing plans. The reverse auctions were first used for non-production items and were mainly targeted at price reduction. The company started to take a lead in this approach by targeting 50 per cent of the future reverse auctions to be for more sophisticated and newer products and services.

The benefit expected from the practice include lower price for similar or higher quality goods (for certain products savings are considerable; for instance, 81 per cent cost saving on CAD products and 53 per cent on labels have been experienced.), shorter cycle times for completing negotiations with suppliers, support for cross organisation purchasing by volume leverage, exploring potential new suppliers (although traditional suppliers are still winning bids in many cases), and consolidation of business with fewer suppliers.

In terms of products and market according to the company the practice of the reverse auction has best worked for MRO supplies and commodity items with less complexity. Savings on costs are considerable only for the right products, typically products such as oil filters, cables, office consumables, and also furniture. The application of the technique for more complex products, which is now being considered, has been justified where it does not involve high switching costs. This has proven true in the experience of the company for new products where the successful suppliers would be given design responsibility. In fact, each supplier bids on a detailed design proposal unique to itself rather than a common specification issued by the buyer. The experience of the company also shows that the technique does not work if there is a small supply base, which means that few or in the worst case only one of the suppliers is technically capable of supplying the part.

An initial concern with regard to the market and products is that the case company is competing in a different market from that of most other members. While the future strategies of the company target more customised products and services the e-marketplace is mainly focused on cost reduction through commoditisation of products and buying aggregated lots of products.

In terms of ownership the company is a part of a coalition of automotive manufacturers who have formed an e-marketplace for the group. The coalition e-marketplace, which acts centrally, manages the operations based on the rules and

regulations set by the alliance. There is a limited level of control for each member and this can lead to limitations in times where the company has to abide by the rules which do not necessarily match its particular interests. This can prove to be conflicting with the future plans and strategies of the company and its supply chain.

The main functionalities offered by the e-marketplace so far are RFP, suppliers' information, auctions and reverse auctions. Further, functionality is considered as future plans by the e-marketplace including collaborative supply chain planning and management and total integration of supply chain. The latter functions are those from which the company could benefit more in managing its supply chain and achieving its objectives. In particular, the impact of the e-marketplace operations on the company's relationships with its suppliers could be detrimental to the alignment and management of its supply chain.

Case two

This case company is a global mobile phone manufacturer based in the USA which has operated a privately owned marketplace since 2000. A sourcing manager of the company was interviewed.

The mobile phone manufacturer highlighted that they incorporate their private marketplace in an attempt to leverage the procurement function towards a single global supply chain environment. They sit firmly on the buy-side of the e-Marketplace and do not use it as a mechanism for selling.

As their components are 100 per cent outsourced, the e-marketplace, and in particular the ability to operate reverse auctions online, has greatly assisted in their quest to lower prices. This facilitates greater reach geographically than was previously possible before e-marketplace functionality was available to them.

It was, however, highlighted that online reverse auctioning was still only responsible for 5-10 per cent of their overall procurement, and it was not necessarily suited to all types of sourcing. They considered their component base as being divided into three categories; off-the-shelf, semi-custom and custom, with only off-the-shelf items being sourced via auctions in any great numbers. They feel that face-to-face negotiation and the increased level of relationship this can bring, is more important than simply price when procuring more complex items. This agrees with our findings in Figure 3.

For the more complex items, communication and collaboration occur via the e-marketplace environment, with the likes of their electronic instant messenger tool and the sharing of product designs, but new agreements are only likely to be secured after some level of face-to-face discussion. This high level of collaboration is the result of the type of close relationships that can only exist in a privately owned environment, as shown in Figure 4, looking at the relationship between required functionality and marketplace ownership.

Discussion

The two companies who are among the major players in their own industry and sector have demonstrated a strategic intent towards the adoption of e-marketplace as a means for exploiting the chain and providing the ground for shifting their competitiveness. While the initial drive for both cases to adopt e-marketplace practice seems to lie in the issue of product and operations cost reduction, further potentials have been realised by

both companies persuading them in the continuation and expansion of the practice. The companies have however approached the practice with caution starting from a few basic commodities in low volumes extending to more specialised items in high volumes, and with extensive plans for the future. Employing the e-marketplace for supporting future product customisation strategies seems to be only possible after sufficient confidence and expertise developed within the company and its supply chain, and also the fear of disruption and disintegration of the chain is overcome.

Figure 6 shows the positioning of the two cases using the classification models. From the figures it is evident that the companies' strategies do not fit the most suitable state at the time of the study, except for model three, and that the companies should consider moving their position towards recommended best situations.

Another aspect of the case studies refers to the probable disturbances and disruptions the practice of e-marketplace could bring about for the companies and their supply chain. This issue, in terms of physical and operational aspects, has mainly been reflected in the internal preparation and organisational competency for handling the new approach, and resolving internal conflicts and lack of communication. The main side of this issue relates to the behavioural concerns that could affect the relationships within the companies' organisation and also between parties in the supply chain. This aspect is beyond the discussion of this paper and is presented in a separate paper (Sharifi *et al.*, 2003). In general, however, our study has shown that e-marketplaces could cause considerable disturbances within the chains in terms of relationships and the behaviour of partners and parties which could damage the integration and alignment of the chains.

E-marketplace classification as a complementary tool for the DNA model

The physical strand of the DNA model for e-marketplaces leads to the determination of the e-marketplace strategy and the subsequent operational steps for implementation. The proposed e-marketplace classifications in this paper contribute to the determination of e-marketplace strategy by first identifying the appropriate form and approach. Figure 7 shows the route through which the e-marketplace strategy is defined using the input from the DNA analysis. The classification models will provide the information and analysis specific to the e-marketplace which will be used in the definition of strategy. This model will be the subject of further work to extend the dimensions and implementation aspects of the DNA approach to supply chain management.

Conclusion

The growth in importance and adoption of electronic marketplaces has meant that issues surrounding selection and operation have become strategic procurement and hence supply chain management consideration. Owing to the fast and vast expansion of e-marketplaces, it is growing to become a critical subject in the management of demand networks and in particular with regard to their alignment. Criticalities and disruptions associated with the application and adoption of e-marketplace practices make it necessary to integrate the strategy of approaching e-marketplaces with the supply chain management and alignment strategies. To provide a strategic framework for the identification and selection of appropriate e-marketplace approach a number of classification models linked to the demand network alignment concept and methodology

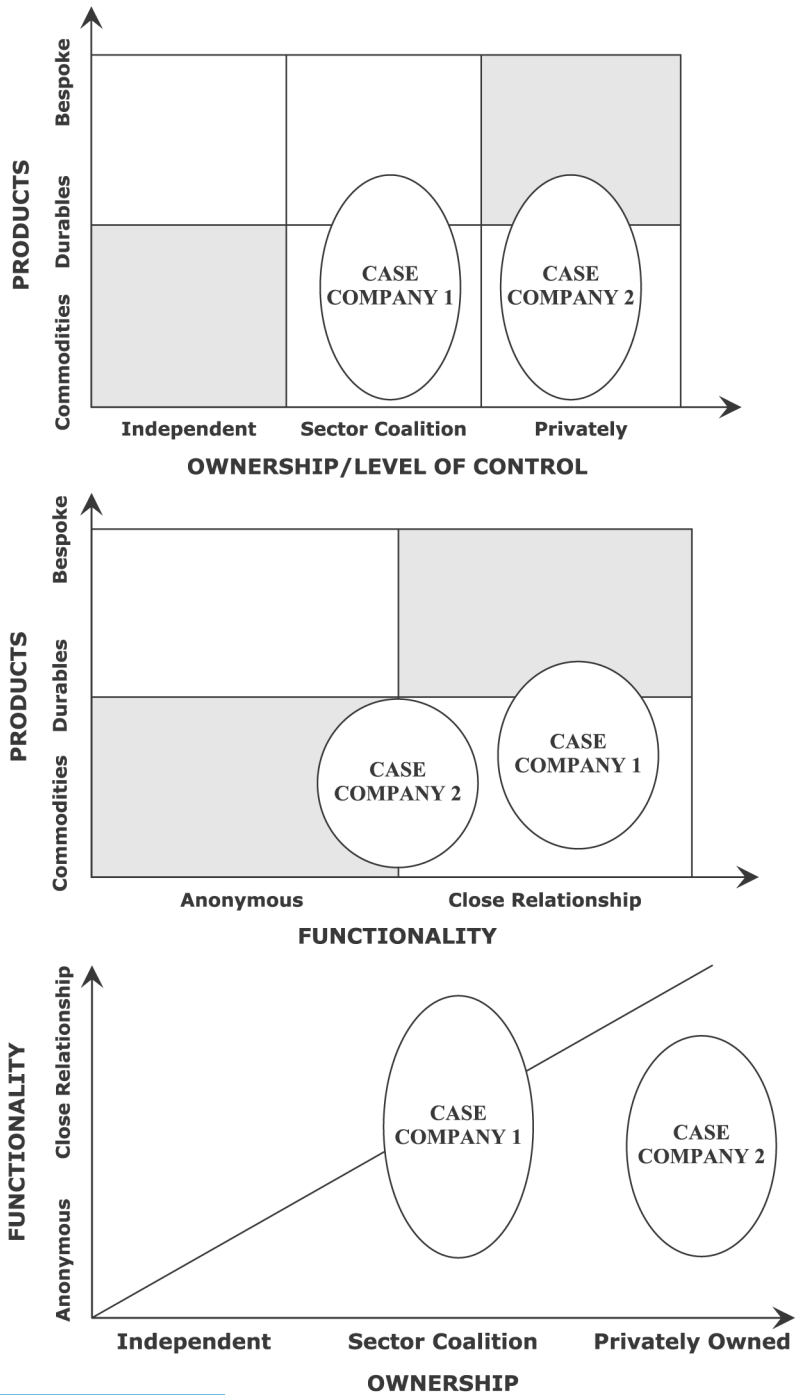


Figure 6.
Positioning of the case
companies using the
classification models

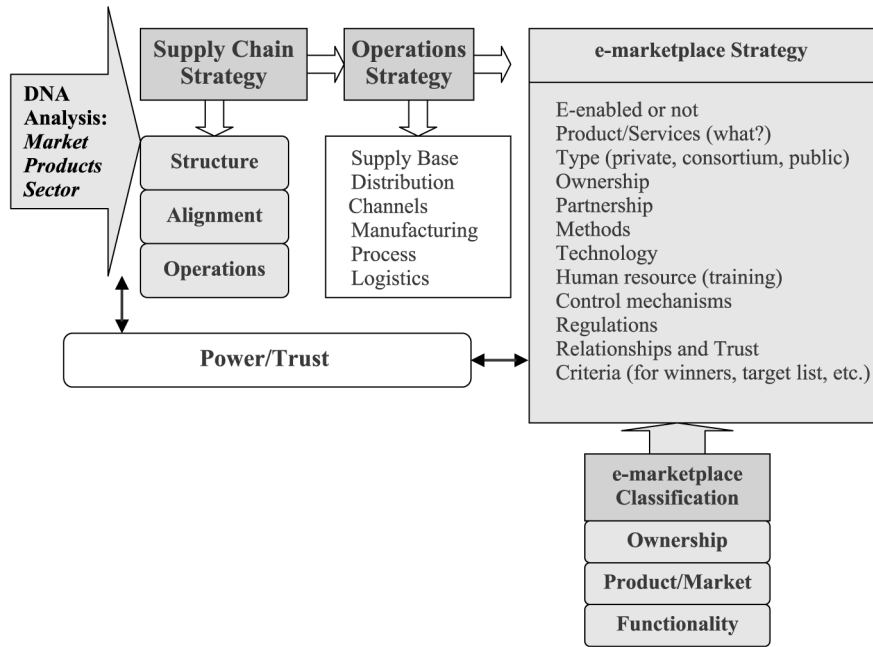


Figure 7. Determining the e-marketplace strategy using DNA model

are proposed. The key dimensions to this classification approach are the nature of the products/services to be traded, the ownership/formation of the marketplace and the level of functionality/relationships exhibited by the trading exchange. The strategic role of an e-marketplace is also identified as being dynamic in nature over the product/market lifecycle and the ongoing development of information systems and technologies. This is in conformance with the deployed view of DNA model in which the intertwining strands of demand networks evolve and change with the change in the circumstances of the business environment, while interacting with each other.

References

Anonymous (2001), "The universal integration framework: integrating enterprise processes and content into new e-business strategies", The Washington News Bureau.

Bartezaghi, E. and Ronchi, S. (2003), "E-sourcing in a buyer-operator-seller perspective: benefits and criticalities", *Proceedings of the 2003 EUROMA-POMS Conference, Como, Italy*, June, pp. 16-8.

Bower, J.L. and Christensen, C.M. (1995), "Disruptive technologies: catching the wave", *Harvard Business Review*, January/February, pp. 43-53.

Boyle, B. and Alwitt, L.F. (1999), "Internet use within the US plastics industry", *Ind. Mark. Manage.*, Vol. 28, pp. 327-41.

Brunn, P., Jensen, M. and Skovgaard, J. (2002), "E-marketplaces: crafting a winning strategy", *European Management Journal*, Vol. 20 No. 3, pp. 286-98.

Chopra, S. and Van Mieghem, J.A. (2000), "Which e-business is right for your supply chain?", *Supply Chain Management Review*, July/August, pp. 32-40.

- Chung-Shing Lee (2001), "An analytical framework for evaluating e-commerce business models", *Internet Research: Electronic Networking Applications and Policy*, Vol. 11 No. 4, pp. 349-59.
- Cunningham, M.T. and Calligan, N. (1991), "Competitiveness through networks and relationships in information technology product markets", in Paliwada, S.J. (Ed.), *New Perspectives on International Marketing*, Routledge, London.
- Damanpour, F. (2001), "E-business e-commerce evolution: perspective and strategy", *Managerial Finance*, Vol. 27 No. 7.
- Deeter-Schmelz, D.R., Bizzari, A., Graham, R. and Howdysshell, C. (2001), "Business-to-business online purchasing: suppliers' impact on buyers' adoption", *J. Supply Chain Management*, Vol. 37, pp. 4-10.
- Digital Union (2001), "Buy-side commerce strategic sourcing: tendering, RFX, auctions, reverse auctions, e-procurement", white paper, available at: www.digitalunion.com/pdfs/WP-buy-side-commerce.pdf
- Harman, W. and Tribiahn, J. (2001), "Overcoming the challenges of implementing reverse auctions", working paper, Warwick Business School, Coventry, July.
- Hasen, M.A., Mathews, B.A., Mosconi, P.A. and Snakran, V. (2001), "A buyers' guide to B2B markets", *McKinsey Quarterly*, No. 2.
- Jap, S.D. (2002), "An exploratory study of the introduction of online reverse auctions", *Journal of Marketing*, Vol. 67 No. 3, pp. 96-107.
- Jones, D. (2000), "E-purchasing saves businesses billions", *USA Today*, Arlington, 7 February.
- Kaplan, S. and Sawhney, M. (2000), "E-hubs: the new B2B marketplace", *Harvard Business Review*, May/June, pp. 97-103.
- Kehoe, D.F., Boughton, N.J. and Sharifi, H. (2002), "The role of e-Business in demand network alignment", paper presented at 7th International Symposium on Logistics "Integrating Supply Chains and Internal Operations through e-Business", Melbourne, 14-17 July.
- Kehoe, D.F., Sharifi, H. and Boughton, N.J. (2001), "Demand network alignment: an empirical view", *Proceeding of UK Symposium on Demand Networks Alignment, July, Liverpool*.
- Love, T. and Tellefsen, B. (2003), "Constituent market orientation and ownership of virtual marketplaces", *Journal of Logistics Information Management*, Vol. 16 No. 1, pp. 8-17.
- Masood, S. (2001), "Volkswagen pioneers the covisint alternative", *Infoconomy*, December, available at: www.infoeconomy.com
- Morgan Stanley Dean Witter (2000), "B2B internet report", available at: www.morganstanley.com/institutional/techresearch
- Porter, M. (2001), "Strategy and the internet", *Harvard Business Review*, March.
- Scullin, S.S., Fjermestad, J. and Romano, N.C. Jr (2004), "E-relationship marketing: changes in traditional marketing as an outcome of electronic customer relationship management", *The Journal of Enterprise Information Management*, Vol. 17 No. 6, pp. 410-5.
- Sharifi, H., Kehoe, D.F. and Boughton, N.J. (2002), "E-business models in the support of demand networks alignment", *Proceedings of the 2002 POMS Conference, San Francisco, 5-8 April*, pp. 5-8.
- Sharifi, H., Kehoe, D.F. and Burns, N.D. (2003), "A structured framework for analysis and understanding of factors impacting the effective application of e-marketplaces", *Proceedings of the 2003 EUROMA-POMS Conference, Como, Italy, June 16-18*, pp. 16-8.
- Singh, M. (2002), "E-services and their role in B2C e-commerce", *Managing Service Quality*, Vol. 12 No. 6.

- Smeltzer, L.R. and Carter, J.R. (2001), "How to build and e-procurement strategy", *Supply Chain Management Review*, March/April.
- Temkin, B. (2001), "B2B success: going beyond e-marketplaces", *Supply Chain Management Review*, July/August.
- White, A. and Daniel, E.M. (2004), "The impact of e-marketplaces on dyadic buyer-supplier relationships: evidence from the healthcare sector", *The Journal of Enterprise Information Management*, Vol. 17 No. 6, pp. 441-53.
- Witekar, J.D., Murphy, M.D., Haltzel, A.H. and Dik, R.W. (2001), "Private exchange: the smart path to collaboration", *Supply Chain Management Review Global Supplement*, July/August.

Further reading

- Kehoe, D.F., Sharifi, H., Boughton, N.J., Burns, N.D. and Dani, S. (2006), "Demand network alignment: aligning the physical informational and relationship issues in a supply chain", *International Journal of Production Research*(in press).

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