

Industrial Networks and B2B E-Commerce; A Conceptual and Contingent Exploration

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Abstract

The B2B e-commerce bubble appears to have burst. In the breathing space that has emerged we have chosen to attempt to conceptualise the relationship between two kinds of B2B markets and two types of e-technology. The market forms we have labelled "competitive" and "relational". The former is based on the classical economic notion of purely competitive markets and the latter corresponds to what we would consider the defining phenomenon of IMP research and writing. The two e-technology forms are virtual marketplaces, where buyers and sellers exchange in cyberspace, and EDI like systems where buyer – seller relationships are mediated by various forms of e-technology. The question we seek to answer therefore becomes "How likely, in theory, are these two e-technologies to flourish under the two different market regimes?"

We have used a simple Critical Realist model of explanation that assumes that events occur as the result of combinations of certain driving forces and certain contingencies. We argue for mutual causal relationship between e-technology and B2B market forms and therefore reject naïve technological determinism.

For both competitive and relational markets we describe the driving forces and contingencies that we believe lead to their occurring and suggest how the chosen e-technologies might be facilitated or constrained by these market "forces". Finally we suggest what may actually be happening in terms of the adoption of these two technologies in practice and offer suggestions as to areas of future research.

Introduction

Almost all the papers B2B e-commerce published in the last year or two begin with a quote like the one below (Nokkentved and Hedaa (), Leek et al (2000)

"For the year 2004, Forrester Research predicts US B2B revenues of \$2.7 trillion, AMR Research believes B2B e-commerce will be \$5.7 trillion, and Jupiter Communications sees B2B online trade reaching \$9.7 trillion. Gartner Group expects that by 2005 more than 500,000 enterprises will participate in e-markets as buyers or sellers." Anon (2001)

But other kinds of quotes like the one below are likely to become more common in the future.

"...we have learned that only 8 percent of manufacturers, for example, have adopted e-commerce as a method of doing business. " Resch (2001)

It is fair to say that from our current perspective the gilt seems to have come off the gingerbread. The great optimism that underpinned the launch of many new e-commerce ventures appears to have been largely hype. Whether the B2C and B2B e-commerce setbacks caused the current US downturn or vice versa is difficult to say but it is clear that they are intimately related. However as with many such revolutions it is likely that the guerrillas have simply gone underground. Many much heralded, then derided, revolutions have proceeded via sustained incremental rather than discontinuous change.

However every cloud has a silver lining. From a survey we have been carrying out over the last 18 months it seems that the reaction to the e-commerce among managers in UK B2B markets has changed radically over the last year. In the 1999 / 2000 "growth" phase of new virtual markets there was a disabling tension evident. On the one hand there existed extreme nervousness about taking on e-commerce in any form but a token website. On the other they were concerned about the being left behind by their competitors in ways that they could not even begin to understand. The apparent postponement, *sine die*, of the B2B e-commerce revolution was therefore met with a collective sigh of relief and the business of business was resumed.

However we really ought to take advantage of this breathing space to consider the implications of e-technology on the markets we study. While we have no intention of following the well trodden path of trying to forecast what will happen when in the highly volatile world of e-commerce, we do believe it will be useful to attempt to see where, in very broad terms, the cleavage planes of progress might be. A number of researchers, or more accurately commentators, have already asked the question "What impact will e-commerce have upon B2B markets?" Couched in this form the temptation has always been to offer what sociologists are wont to call grand narratives, though there are exceptions (Timmers (1999)). However we are determined to ask a somewhat different and more differentiated question. First of all it is clear that that e-technologies are already being used in B2B markets and indeed have been for some time. So it is entirely sensible to argue that the question is not whether but to what extent and when. It also seems highly unlikely

that the answers will be, respectively, "to a very limited extent" and certainly not "never".

However it is also important to consider differentiation both in terms of the e-technologies concerned and the types of markets that come under the banner of B2B. Both e-technologies and B2B markets are heterogeneous and it is entirely to be expected that the relationship of one to the other will not be simple. In particular it is already obvious that e-commerce can be carried out, at least in part, via single e-technologies or by combinations or systems. The answer to the question "What impact will e-commerce have upon B2B markets?" is therefore going to be a not very helpful "it all depends".

What we can do is a more limited exercise that looks at the conceptual relationship between two kinds of B2B markets and two types of e-technology. We therefore concentrate on two ideotypical B2B market types that we will dare to call "competitive" and "relational" (hereafter competitive and relational). The former label is based on the classical economic notion of purely competitive markets and the latter corresponds to what we would consider the defining phenomenon of IMP research and writing. It should be noted these market definitions are essentially behavioural. In other words participants have some, but not complete, freedom, to decide whether they act as free marketeers or relationship maintainers.

These two ideotypes could be argued to represent two ends of a continuum. This is a somewhat dangerous notion since it implies that they differ only in terms of a single dimension and that can hardly ever be the case. Let us say rather that they are non-polar opposites. Such a division is made in order to simplify a complex situation as we are forced to do on many occasions. Hopefully we will remain sensitive to the gross assumptions that we have made.

Again we propose to simplify the analysis by concentrating on just two e-technologies forms; virtual markets and EDI like systems. The question we seek to answer therefore becomes "How likely are these two e-technologies to flourish?" The answer depends upon a simple Critical Realist model of explanation. Events occur as the result of certain driving forces and certain contingencies. For example a principal contingency that we use here is that of the nature of the product / service offering. It is quite crucial in many situations in determining the nature of markets of any kind yet the recognition of this fact has received relatively little attention (Easton (forthcoming)).

It is also essential, we believe, to think in terms of a mutual relationship between e-technology and B2B market forms and not to subscribe to a form of naïve technological determinism (O'Mahony and Barley (1999)). While the material underpinnings of e-technologies are somewhat fixed, the ways in which they can be combined are infinite and so their profile at any time can and will be influenced by the uses to which they can be put.

The structure of the paper follows from our overall argument. For each of competitive and relational markets we describe the driving forces and contingencies that we believe lead to their occurrence. Next we suggest how the chosen e-technologies might be facilitated or constrained by these market explanations. Finally we suggest what may actually be happening in terms of the to the adoption of these two technologies in practice and offer suggestions are so areas of research in the future.

Competitive markets

Competitive markets can best be characterised by reference to the classic theoretical economic model. The conditions for a perfectly competitive market are; a standard product or service, many buyers and sellers of equal size, absence of substitutes and perfect cost-less information. In this section the arguments for the importance of each of these conditions is discussed and the possibility of their being achieved in practice evaluated.

The basic driving force for both buyers and sellers is to maximise the utility of each exchange as it occurs with no future prospects taken into consideration. Utility is relatively easily defined in this case. For the buyer it is achieved by buying the amount of product that they require at a particular point in time at the lowest possible price. For the seller utility is maximised if they sell all they can produce at the highest possible price.

However in such markets sellers are price takers. They cannot do other than sell their products or services on the open market. They will however seek to reduce competition wherever possible but with a standard product and full information there is no mechanism by which they can charge more than any other supplier. Buyers may have different needs and wants but given that there is only a standard product available, buyers also have to be price takers. However buyers seek to prevent price discrimination by continually searching the market for lower prices thus keeping the market competitive. They may even shop around as a tactic to keep suppliers

honest. In such "efficient" markets the consumer surplus remains with the consumer and suppliers survive on returns equal to the cost of capital (Grover and Ramanlal (1999)). However it should be noted that Dolan and Young (2000) argue there are, in practice, at least 3 different market price mechanisms; "efficient" markets as described above but also set price and negotiated price markets each with a number of subclasses. In the latter cases there are contingencies that dictate that what mechanisms are the most appropriate for the products, buyers and sellers concerned.

There are a number of conditions that need to apply if a market is to operate "efficiently". A key contingency is product form. The product or service offering must be identical from all sellers and in the eyes of all buyers. It must be a commodity. If it were not then not only would sellers have different cost structures but more importantly buyers would be able to discriminate among the products from different suppliers and therefore be willing to pay different and, on average, higher prices. Higher prices because the variety of products available would more accurately match the different needs of buyers. Put another way, in a perfectly competitive market, buyers, in effect, accept that there is only one product specification but this is an acceptable trade-off because it drives down the price to the minimum possible. In practice such standardisation is almost impossible to achieve. While the physical properties of the product may be equivalent the service elements will be less easy to standardise. For a common market price to hold the delivery costs must be equal or equalised. Under what conditions can this occur? It may be that all the sellers and buyers are heavily concentrated in space. Or that the costs of transportation are negligible. This could occur if the product is information heavy and can be electronically transported but otherwise not (Evans and Wurster (1997), Naude et al (2000)). Of course better positioned suppliers might expect to do better overall. If spatial distribution is a problem then so also is distribution across time i.e. availability. For most products production systems are not instantaneous and stock costs are reasonably significant so one cannot assume that immediate delivery is possible, again with the exception of information. Of course immediate delivery would be the optimum for customers since it would allow them to make last minute decisions, make planning easier, reduce the need for contingency planning and stocking costs. In practice all markets are dynamic to some extent and there would be short-term mismatches of supply and demand. In sellers' market, price discrimination would be possible.

An extreme form of this imbalance is the distress purchase where buyers needs are for instant exchange and are prepared to pay way over the normal price to avert an expensive event occurring such as an aircraft grounded for want of spare parts (Choudhury et al (1998)). In the aircraft parts industry most spares are bought through relational markets but distress purchases can be made through a VM, the Inventory Locator Service.

Other intangible aspects of service provide a basis for differentiation by design or accident. These sources of differentiation are particularly difficult to discover and are often generalised from rather meagre pieces of evidence in order to justify the choice of one seller or buyer over another. In particular they may be to do with people and how they treat one another. For example the way a written communication is worded or designed can convey meanings that serve to differentiate different potential market participants.

In terms of material product characteristics uniformity is possible. However it is the perceptions of buyers that is important. Reputational or brand effects occur even without sellers really trying to create them when in reality they would always try to do so. Furthermore non-material aspects of the product offering are likely to be particularly inhomogeneous. Service based offerings such as consultancy or outsourcing can hardly be regarded as standard. But every product offering has a service component that allows for differentiation of the offering e.g. delivery, pre and after sales service, credit etc.

An equally important set of contingencies relates to the role the offering plays in buying firm. If the product is of high value then buyers would be more concerned to get the best possible offering / price combination. Similarly if the product offering is low value but essential the same situation would apply (a safety valve on a high pressure system).

Perfect cost-less information is also a theoretical ideal but that too would be influenced by certain contingencies. Information has a number of functions in markets. For economists it is largely to do with knowledge of who the sellers are and their prices, assuming standard product offerings. However uncertainty and risk are important factors in organisational buying behaviour. Even with standard products such as PCs there would be many situations where their successful use within a firm would be uncertain. In other words market based information is not necessarily enough to reduce risk.

Risk can come from many sources e.g. the novelty and complexity of the purchase. In these cases buyers will tend to want to discriminate between sellers even though there may be few actual differences. Another crucial contingency would be frequency of purchase. Infrequent purchases mean that knowledge of the market is likely to be much less and so history is not available as another resource.

Absence of substitutes is clearly an important condition. If there are other ways of doing something then they provide an alternative against which the original market has to compete. A good example would be to substitute the purchase of a product (an in-house printing machine) for a service (an outsourced printer). This contingency reminds us that market boundaries can rarely be so clearly defined as economists would like i.e. gaps in the chain of substitution.

Market structure has an important impact upon market conditions. For a competitive market the condition is a large numbers of buyers and large numbers of sellers. In both cases the argument is that no buyer or seller should be able to impact the market price by any action such as withdrawing from the market. Equally important is that large numbers tend to militate against collusive practices of various kinds by either buyers or sellers. Again, in practice, such conditions are rather rare. There is a good deal of evidence that distributions of purchase size, firm size and many other kinds of economic variables tend to be highly asymmetrical.

While the model is basically a "rational" economic one we should also point out the obvious. There are other, psychological and social, explanations for competitive market behaviour. "Making the market work for you" is one thing that purchasing executives are often taught to do. In one sense this is simply a manifestation of the economic ideology of free markets that permeates and underpins so many managerial and governmental attitudes. However one should never underestimate the power that it commands. The same ideology reinforces the prominence given to price in exchange processes by both buyers (as in getting a bargain) and by sellers (as in lowering the price as the first strategic market option taken when times are hard). The prominence of price is further boosted by its quantitative character. It has a single simple metric whereas all other facets of the exchange are more multidimensional.

Overall what we can conclude is that it is unlikely that the extreme conditions required by the classical economic model would hold in practice. We might not, in practice, expect to find many markets with these characteristics. Many of the contingencies are simply too restrictive for this to be the case. However the short -

term orientation of the actors and their belief in the power of markets can work such that even where the contingencies militate against competitive markets, actors treat them as such.

But there is an alternative asymptotic argument. Although no one would expect all the necessary conditions to hold, the closer reality is to those conditions the more competitive, in the sense we have been using the term here, the market would be. While this proposition seems reasonable, and one that we will accept for the remainder of the paper, it is by no means totally convincing. The theoretical arguments are based upon a set of premises and logic. They say nothing about the case where any of those premises clearly fail to hold. What we intend to do later in the paper is to examine what might happen if one of the assumptions – near cost-less information – can be made to happen in reality.

Relational Markets

The model that explains how relational markets work and why they exist is much more complex and less well specified than that for competitive markets. In terms of behaviour, relational markets are characterised, in extremis, by a small number of buyers and sellers that have each formed a small number of strong, long-term relationships among themselves. This implies that buying firms do not switch between sellers on a continuous basis though they may multi-source from a small number of such partners. An important characteristic of such relationships is the relationship specific adaptations that firms make, often at great expense. These include adaptations in the exchange process (e.g. delivery (JIT), stockholding practices, contractual forms, and prices), to products and services (tailor making) and in operations (design to manufacture, design to include and joint production planning).

But why do firms behave in this way? It seems that they are deliberately forsaking the efficiency creating effects of competition. They are not playing one supplier or customer off against another. Again the driving force in this case is a form of utility maximisation that provides two kinds of explanations, economic and social.

The economic explanation argues that firms form relationships because they can both more *efficient* and more *effective* by doing so (Naude et al (2000)). The crucial difference from the conditions required for a competitive market is that in relational markets time matters. The basis for this argument mainly rests on the concept of relationship formation as investment. To put it in a nutshell, investment in

relationships, particularly via adaptations, allows both buyers and sellers to continue to obtain returns to that investment over a long period. In doing so they tend to forgo the short-term gains associated with playing the market. Which of these two market situations they wish to take part in will, or perhaps should, be determined by the particularly contingencies at work in that time and place.

Efficiency can be defined as doing the same things with fewer resources. There is almost no aspect of the extended exchange process that cannot, in principle, be made more efficient by forming a long-term relationship. For example economies of scale and scope can be reaped in seller and buyer operations and in the exchanges between, as a result of concentration of these activities within a single or small number of relationships and over an extended period. The investments in relationship specific material resources and human and social processes is underpinned by the predictability that stems from knowing that one is in a stable long-term relationships with some guarantee that they will be rewarded over the long term. Working together over a long period also makes it likely that learning will occur at the interface allowing new ways of doing things to be discovered. Planning of activities also becomes more efficient when it is know what the partner firm intends to do in relation to the joint activities that will be undertaken.

Similarly new activities can be created in this situation. Entirely new products and operations and exchange processes can emerge from the relationships which are themselves non relationship specific and so can be also be exploited in other relationships or via other firms. In this way the effectiveness of both actors can be increased.

One further economic benefit is the potential reduction in risk that can face both partners. Risk comprises both uncertainly and the outcomes that can occur as a result of something untoward happening. Uncertainty can be reduced as a result of an actor being better able to estimate the uncertainty of future joint or individual actions if they have, through the course of a long term relationship, come to know their partner well. In addition, mutuality and trust, which are often features of long term relationships, can ensure that should the unthinkable occur, their partner will do the best possible to mitigate the impact (Leek et al (2000)).

There are however some economic disadvantages to strong, long-term relationships. Adaptations not only absorb resources but also create high exit costs. This will not matter if it is clear that current relationships are offering higher returns than alternatives. However if they are not then the costs of breaking old and creating new

relationships must be factored in the economic calculations. It is not suggested that such calculations are actually made, merely that the actors concerned are aware of them as underlying factors and take them into account in deciding if and how a relationship should be entered into.

There are also social explanations for the existence of relational markets. Buying and selling firms also make social adaptations. They adapt their organisations (key account management systems), train their staff to understand their partners, develop mutuality as part of their culture, "learn to speak each others language" and even come to like one another at a personal level. However one of the results of such social bonding may be a trade off between the economic and social returns to a particular relationship. At best this could mean that inertia is created so that evaluation of a relationship does not happen unless something drastic occurs. At worst it could mean ignoring even the latter eventuality and continuing a relationship beyond its useful life.

Under what conditions do relational markets flourish? A key product contingency is that of differentiation. If all the buyers in the market want and need different product and service features then there are strong grounds for pairings of particular sellers and buyers to occur. The extreme case of differentiation involves tailor making where each product is designed specifically for one customer and thus there can be no "market" for it. An even more extreme example of such a product is one where the development process for a new product by the buying firm takes a project form because of the time period involved (e.g. avionics systems for a new aircraft). Product offerings with high service components also fall into this category. In all of these cases relational behaviour might be expected.

Strangely, frequency of purchase does not necessarily distinguish between competitive and relational markets. In the former case frequent purchases allow the market to function through exercise of buyer and seller options on a frequent basis. In relational markets frequent exchange facilitates the formation of relationships and the creation of adaptations. The involvement of high value and / or essential products would however discriminate in relational markets since their value provides a rationale for investment and essentiality a reason to reduce risk through long term relationships.

The absence of cost-less and accurate information of various kinds is likely to be a strong driver in favour of relational markets. Such information may simply be lacking due to various uncertainties rather than as a result of any failure in terms of market

information. This is particularly likely to be the case where the product offerings concerned are complex, either in material or social terms, or they involve a degree of novelty for either or both partners. In these contexts the formation of relationships is an obvious strategy in order to reduce uncertainty and ensure that when problems arise the partner will be willing to provide help. This is likely to be forthcoming even on strictly economic grounds since both partners will wish to protect their investment in the relationship and receive the returns to be expected in the future. Where market information is difficult and expensive to obtain because of the fragmented nature of the market it remains a viable strategy to form relationships. In this case the argument is that the costs of searching for and adapting to the best partner are so high that a satisfactory relationship would be the most efficient option especially when that relationship can be improved through time.

The market structure that is likely to privilege relationships, rather than competitive markets, is one that is close to some combination of oligopoly and oligopsony i.e. few sellers and few buyers. Firms cannot support hundreds of close relationships. What they can do is to choose those customers and suppliers with whom this is a desirable option for the economic and / or strategic reasons outlined above. Another network form of mechanism may occur in these concentrated markets that reinforces the need for relationships. Firms may find themselves increasingly being excluded from partnering particular actors because of the more or less exclusive relationships that they have already formed. In this situation forming relationship is a defensive strategy and the market one where competition is occurring between vertical market channels rather than individual firms. In addition firms that are members of lengthy or global supply chains might be expected to be ripe for relationships to safeguard their network positions (Naude et al (2000)).

From the list of contingencies discussed above it is difficult not to conclude that many, if not most, B2B markets will have strong relational characteristics. Because the model is somewhat less precise than the classical economic one, it is easier to argue that relational is a relative term in this context. In other words markets are likely to be more or less relational and form a distribution rather than being stereotypically relational or not. What might, and often does, militate against their occurrence is the absence of the long-term orientation required by the actors.

The next step in the analysis is to attempt to characterise the nature of the relevant e-technologies and then go onto ask whether and how they might impact, and be impacted in, these two market situations.

Forms of E-commerce

E-business is generally regarded as the implementation of e-technology with the widest scope. Timmers (1999) describes it as "doing business electronically". Doing business is meant to include any kind of activity a firm might undertake including internal processes. Electronically implies the movement and storage of data (defined widely) by electronic (and normally digital) means. E-commerce can be regarded as a subset of e-business that confines itself to "any form of exchange between actual and potential organisational suppliers and customers via an electronic medium". The creation of these kinds of boundaries is however recognised as being arbitrary. A more conceptual definition is given by (Lucking-Reilly and Spulber (2001) "The popular phrase "B2B e-commerce" refers to the substitution of computer data processing and Internet communications for labor services in the production of economic transactions".

The forms that the technology can take are, for the most part, fairly widely known and many are entirely familiar. They include telephony (static and mobile), Fax, Email, Electronic Data Interchange, Internet, Intranet, Extranet, Portals, Virtual markets and a whole new set of hybrid forms that combine some, or indeed all of the above. It should be clear from this list that e-commerce, widely defined, has, in the past, helped to transform market processes due to the use of telephone, fax and more recently, email and mobile telephony.

However in order to simplify the analysis we will be concentrating on two of the newer forms of e-technology; virtual markets (VMs) (also known as or including electronic marketplaces, online marketplaces, e-malls, e-auctions, (Chen and Wilson () third party market places etc) and inter-organisational information systems (IOS). The former are basically marketplaces where buyers and sellers can seek each other out by electronic means. They may perform one or more of three functions; identification, selection and execution (Choudhry et al (1998)) Typically they involve large numbers of both buying and selling firms working through one or more electronic hubs. VMs can be characterised in a number of different ways. They differ in terms of the extent of the services they offer (from dating agency through to

complete exchange support systems), who controls them (buyers, sellers, independents) and the scope of their clients (vertical, horizontal or mixed forms). IOS is a general term that describes means by which firms can carry out their (regular) interfirm interactions, broadly defined, by electronic means. Timmers (1999) identified 11 different business models that could and have been employed in e-commerce and categorised them in terms of their novelty and the degree of interfirm co-ordination that they implied. In the following section some of these models, in order of increasing co-ordination, are described.

Extranets provide a means by which two partners can share information. For example a supplier could offer a customer access to its operations scheduling database so that the progress of orders through operations could be monitored. Previously such information would probably have come via a key account executive. A further step is to carry out some elements of exchange (e.g. ordering) via transaction software and communication channels (Angles and Nath (2000)). The next step beyond information sharing is full exchange. Carrying out all aspects of interfirm transactions is when e-commerce, strictly defined, begins. While an Extranet simply requires allowing a partner firm to have access to information, e-commerce involves active two-way interaction and substantial adaptation. Such systems as supply chain management, collaborative design and manufacture, virtual consultancy teams and efficient customer response (ECR) offer a further stage of intimacy. Each of these seeks to increase, by electronic means, the co-ordination and control of the activities between and among the firms involved. Some of these systems can be confined to single relationship (design and manufacture). Others demand, because of economies of scale, a wide horizontal scope (ECR) and others strong vertical linkages (supply chain management) (Lancioni et al (2000), Johnson et al (), Hardaker and Graham ()).

However it should be recognised that in practice there are other routes towards e-commerce. So called Enterprise Resource Planning Systems provide totally integrated software systems that allow individuals within firms to work with any system of data collection and transfer, transaction or storage within the firm. Thus an accredited individual can look up sales records, make a travel booking, send a report from a technical database to an overseas office and amend her personnel records all via the same PC interface. The more advanced systems also support the extension of these facilities to other outside organisations to enable e-commerce not only to occur but be monitored and controlled. Similarly the development of

electronic supply chain management is being facilitated by the use of standard process reference models such as SCOR and CPFR (Nokkentved and Hedaa ()).

What we wish to argue is that the likely success of both VMs and IOSs depends upon the assumption that there can exist potential competitive markets that they can tap into and the extent to which they support or run counter to the conditions for the effective working of those markets.

Competitive markets and VMs

The key contingency that e-technology can affect in relation to competitive markets is the availability of "perfect" cost-less information. In a market with many sellers and many buyers the existence of low cost means for them to contact one another should clearly make the market more efficient by reducing transactions costs for both parties. This can be done by many-to-many systems such as web sites where sellers and buyers can offer and accept exchanges on a global basis. However it seems at first glance that VMs provide an even more effective way of moving traditional markets towards more competitive forms. Any buyer or seller in the world can, in theory, contact any and all potential exchangers via the electronic hub, assess their relative acceptability and consummate an exchange at minimal cost. However while market information can become low cost it is not costless. For example there is, as yet, no single, universal VM but many competitors and this means that to get a complete picture a number of different VMs have to be entered. More problematically the information may not be complete. It is therefore often the case that negotiations have to be opened up with a number of different possible suppliers or buyers. Finally, since the potential seller / buyer will usually be remote there is need for information about their trustworthiness and reliability (Dolan and Moon (2000)). A full service VM will guarantee, to some extent, potential buyers and suppliers, but at a cost and also the reliability of VMs cannot always be relied upon. Clearly there should be no problem with the many buyers, many sellers condition although this does depend, indeed has depended upon, VMs overcoming the natural inertia and conservatism of potential users of their systems. Certain kinds of risk can be covered by the added value VMs. Unfortunately this almost guarantees that the efficiency returns to using VMs will be reduced and therefore less than attractive to would be users.

The conclusion from this simple analysis is that VMs will only work in the cases where the products are of standard specification, low value and inessential. However Dolan and Moon (2000) argue that VMs main benefits may not simply be better price information but also other kinds of information and improvements in market efficiency. "...the Internet facilitates a buyer's acquisition of quality information for various goods, enables suppliers to update prices dynamically in response to observed demand, allows a seller to create a meaningful market of potential buyers with price being the outcome of an auction process rather than prespecified by the buyer, permits a prospective buyer to specify in detail the products requirements and put fulfilment out to bid to an organized market of potential buyers".

The provision and acquisition of more product and supplier / buyer information could negate the requirement for standardisation of products demanded by the classic model. As Bakos (1997) observes, as a result of theoretical modelling, "In differentiated markets, seller profits decline smoothly as search costs are reduced. If search costs become low enough, buyers will look at all product offerings and will purchase the one best serving their needs, resulting in socially optimal allocation. The result would be monopolistic rather than "pure" competition but presumably it could be argued that it would be a more efficient form simply because of the numbers of actors involved.

The other Dolan and Young benefits recognise that the classical model is static and that VMs can offer better efficiency in real markets which are naturally dynamic and imperfect. If this argument is accepted then the range of products that VMs can usefully involve will be rather broader than commodities. But the problems of information costs and risk reduction will be working in the opposite direction. Interestingly there is no evidence, from B2C e-commerce markets that price levels are any lower than those in more conventional channels. In addition Choudhry et al (1998) note that even for aircraft spare parts that are low in asset specificity and complexity VMs are not used and "...the study refutes the presumption that electronic markets always result in the commoditization of the market with intensified price competition".

Relational markets and IOS.

Again the key question to address here is "how will e-technology in the form of IOS be affected by the underlying driving forces and contingencies that lead to relational

markets?" In what follows it will be useful to examine the dyadic relationship and portfolio / network issues separately.

Efficiency in a dyadic relationship can, in principle, be improved by means of e-technology. The set of e-technologies described above can be used to automate parts of the interorganisational data and information stocks and flows that were previously operated via other means (Lucking-Reilly and Spulber (2001), Leek et al (2000)). However it is important to consider certain contingencies when attempting to assess the impact of e-technology. Such data flows and stocks need to be simple, high volume and as unambiguous as possible to take advantage of economies of scale and scope. Retail ECR, for example, works by the networked computer system detecting a requirement for more product, placing an order with a supplier or warehouse and monitoring its progress through to delivery and shelving. Similarly databases (e.g. of production schedules or final stocks) can, in principle, be accessed by both partners in a relationship without interpersonal contact.

These developments will however have important implications for the management of partner relationships. Much of what was previously handled by people would be handed over to machines, data-streams and databases. What these changes represent is a reduction in the involvement of front line employees. Indeed it could, in extremis, result in their disappearance. Yet there remains a need for human involvement (Leek et al (2000)). It could be the case that all of the day to day routines and simple problems will be dealt with by the appropriate systems and people would handle only major crises, new developments and the key human to human contacts. However this still seems a long way off according to Naude et al (2000) who report "A number of users felt they were not yet experiencing the full benefits of EDI precisely because this (start to finish ordering) was absent with the whole system still requiring substantial human intervention".

One might imagine the creation of a new cadre of computer literate, super sales and purchasing people. Of course this is a utopian picture and one that has been promulgated whenever labour has been replaced by capital. Somehow it never seems to work out quite like that since machines can only handle complicated and not complex situations. What however does need to be resolved is a whole series of management issues about the relationships involved both human – human and human machine interfaces.

Specialisation and relationship specific tailoring will almost certainly lead to increases in efficiency, doing the same things with fewer resources. But it seems possible,

even likely, that the rigidities thus imposed will inhibit systemic changes and thereby constrain further efficiency improvements. People based systems are naturally more flexible while being less able to perform routine operations with the same speed and accuracy as machines.

Similarly it is also possible that effectiveness – doing different things- might also be constrained by too much investment in material systems such as IOS. The routinisation of ways of operating may lead to two forms of constraint. The first is that the data are no longer available in a form that allows new ways of doing things to emerge and be acted upon. Secondly the investment in current patterns of operating may make the leap to new patterns not only more expensive but also more risky.

It has to be admitted that part of the power of e-technology is that it can be enormously flexible. For example it can allow vast amounts of control and monitoring data to be collected and can mean that databases be interrogated to produce information that could never have been available before. Nevertheless there remains an issue about the nature of this flexibility. It is not only predetermined by the systems design but the nature of its rigidity may not be entirely obvious to those using it.

Since dyadic partners are likely to be distant it would appear, at first blush, that e-technology would be a huge advantage in developing and sustaining relationships since it both releases scarce human resources and offers more efficient forms of communication and better data. All of the channels discussed above offer the ability to contact and be contacted, easily and quickly albeit in different ways. It could be argued that this couldn't but help to improve dyadic relationships.

However this assumes a rather naïve model of interaction in at least two aspects. First we need to question the assumption that more communication is necessarily better for relationships. There are questions of both quantity and quality involved here. In terms of quantity, the more powerful partner may have increased expectations about both response times and quantities of information that they can successfully demand. This could in turn require the partner to spend time communicating when they could be sorting out the issue. In a more general sense it could actually lead to reduced levels of trust. If it is possible to check up then perhaps the temptation is to do so and not leave the partner the leeway to resolve the situation in their own way leading to a vicious circle. Furthermore data overload

is entirely possible leading to either selecting only the most accessible, and not necessarily the most important, electronic data or simply ignoring it altogether. Quality of communication channels varies. The richest is clearly the face to face situation where body language, linguistic nuances, physical settings and social mores are all provide the potential for better inter-subjective agreement. In addition a face to face meeting usually represents a gift of time by one or more of the participants which may be rewarded by a warmer social climate as well as the reciprocal gift of more meeting time and a better opportunity to strengthen (or indeed worsen!) relations.

All other channels strip away some of this richness, present a colder face and offer great possibilities for misunderstanding. So effectiveness may be lost in pursuit of efficiency. Yet given the wealth of options the tendency must be to communicate when not doing so might be the better option especially taking into account the coolness of the media concerned. In particular there will be increasing pressure to make the human capital more efficient by replacing face to face meetings with less time consuming channels and ultimately removing it through the use of capital based resources such as Extranets.

One of the most interesting and problematic issues in the dyadic situation is the balance of communication and information that is held in people's heads versus that transferred and stored in an electronic form. There are any number of reasons why those who acquire personal non electronic information will not place it on record. They may be too busy, after all the process takes time. Sales people generally hate to fill in customer report forms. They may not wish to share it because it would show their actions in an unfavourable light. They may not recognise its significance. They may not want to provide hostages to fortune. In the end it is likely that the balance will be determined not by carefully researched and thought out schema but by local politics and pragmatism.

Internal management of relationship portfolios is a major problem for any B2B firm. Each customer or supplier has their own requirements and demands and reconciling them creates problems of prioritisation. Part of the problem is that of getting timely information. It follows that a well designed and resourced customer / supplier information Intranet could be used to flag up potential problems and conflicts and help resolve them. The resolution in these cases would most likely involve more senior managers who would have more access to the data and could, in principle, make decisions based simply on the electronically stored data. However such

decisions would rely very heavily on the richness, accuracy and timeliness of the data.

The movement of power to the centre would also create tensions within the marketing and purchasing departments between the front line employees and managers and a probable redefinition of their roles. E-technology could, for example, lead to the dilution of the key account management system. If data about a particular customer or supplier is available on line then, in principle, any other competent front line employee could tackle particular problems as they rose. This suggests a team working approach with responsibility for any customer or supplier being spread throughout the department. The key issues here are whether such a system can support particular relationships and how the responsibilities are to be decided upon in real time.

There is an important technical issue that is also likely to affect the ways in which e-technology penetrates B2B markets. E-commerce has been going on in B2B markets since the late 1970s. Electronic Data Interchange (EDI) systems were set through proprietary value added network systems providers and provided electronic interfirm communication up to and including exchange transactions. However there were a number of competing systems and this meant that firms had to either adopt more than one system or work with only a small proportion of the potential partners (Iacovou et al (1995), Naude et al (2000)). This constraint naturally limited the adoption of EDI (Benjamin et al (1990)). Only 1% of European and US firms had EDI systems in the mid 90s (Timmers (1999)).

The serendipitous development of open systems and Internet protocols (XML) is finally killed them off (Lucking-Reilly and Spulber (2001)). However open systems have to work at the level of the lowest common denominator. As a result software systems have to be very sophisticated to recognise and interface with one another and this increases the investment required to install a comprehensive e-commerce system such as provided by SAP. In addition there are always likely to be network externalities, probably negative in the case of early adopters and positive in the case of later adopters, such that there is a cusp after which it pays everyone to join the system (Riggins et al (2000), Deeter-Schmelz et al (2001)).

A final problem, or perhaps opportunity, concerns the middle ground. B2B firms usually have distributions of customers and suppliers that comprise relatively few large and important partners, a vast tail of relatively insignificant suppliers and customers, and a group that lies somewhere in the middle. A key issue is the choice

of how many and which partners with which to form fully electronic relationships (Angeles and Nath (2000). Bakos and Brynjolfsson (1993) suggest that this number might be quite small. To manage the middle group the concept of a team of non specialised individuals working from an Intranet database might be particularly appealing. Since the customers / supplies are relatively less important fewer data are required and less immediate attention expected. However the formalisation of data collection and access might actually improve the service these group would get. At the tail of the distribution firms might be expected to buy their relatively standard, low cost inessential products through VMs. Similarly low volume customers might be dealt with through supplier based VMs although with non standardised products this would be less of an option.

What seems to be happening in practice?

There has been rapid growth and then decline in the creation of various forms of B2B e-commerce VMs including On Line Markets, auctions portals, virtual markets etc. Many if not all of them seemed to use the improvement in market making processes as the basis for their business models (Segal (2000)). So why were so many VMs set up and subsequently failed? It could be argued that some of that growth was based upon the availability of entrepreneurs and investment capital rather than any obvious market need (Lucking-Reilly and Spulber (2001). And indeed this seems to have been the case since many of these e-commerce market-like systems have run into financial trouble (Chemdex, Investco, PaperExchange, Plasticsnet and Netbuy). But it is also possible that the range of products that would benefit from being exchanged through VMs was too narrow to make many of them viable. For example Covisint, a VM set up by General Motors, Chrysler and other car assemblers, has been slow to take off because of a suspicion that only low value, non strategic items would be involved. The future of VMs seems most likely to be in the MRO sector used by closed single firm industrial distributors like Electrocomponents as just one more ordering channel like call centres.

As for IOSs the situation relatively little detailed research has been carried out. Holland and Lockett (1997) demonstrated via a series of case studies that hybrid e-commerce modes, comprising elements of both markets and hierarchies, were most likely to occur. Leek et al (2000), in their study that investigated all forms of interfirm communication, concluded that "The technological revolution has created a greater number of quick, electronic communications methods however the uptake of

this technology is variable. Brady et al () in their research into the adoption of various forms of e-technology by marketers in Ireland write "...business use of IT is only at the development stage.."

None of this is surprising. There are any number of barriers to the adoption of new technologies that lead to slow and variable adoption. The two we have concentrated on in this paper are the utility of e-technologies and contingency. Utility could be best described as the "what's in it for us?" question. Firms have to believe that there are good economic (and social) reasons for becoming electronic. Such reasons are often not obvious even when they can be shown to exist in principle. Similarly contingency can be redefined as it all depends. We have tried to show that characteristics of, for example, products and markets make e-technologies more or likely to be adopted in different situations. One of the research priorities for the future should be, we argue, better understanding of how these contingencies, and their combinations, work.

References

- Angles, R. and Nath, R (2000), An empirical study of EDI trading partner selection criteria in customer supplier relationships. *Information and management*, 37, 241-255.
- Anon (2001) The E-Commerce Outlook for 2001 Tourbus
- Bakos, Y. and Brynjolfsson, E., (1993), Bundling and competition on the Internet, *Marketing Science*, 19, 1, 63-82.
- Bakos, J.Y. (1997), Reducing Buyer Search Costs, *Management Science*, 43,12,1676-1692.
- Benjamin, R.I., de Long, D.W. and Scott Morton, M.S., (1990), Electronic data interchange; how much competitive advantage, *Long Range Planning*, 23 (1) 29-40.
- Brady, M., Saren, M. and Tzokas, N (1999), Information Technology and its Relationship to Marketing and Marketing Relationship, *Proceedings of 15th IMP Conference*,
- Chen, H-Y. and Wilson, D.T (2000), Online Auctions: Are Relationships doomed? *Proceedings of 16th IMP Conference*.
- Choudhury, V., Harzel, K.S. and Konsynski, B.R. (1998), Uses and consequences of electronic markets; an empirical investigation in the aircraft parts industry, *MIS Quarterly*, 22, (4), 471-507.

Deeter-Schmelz, D.R., Bizzari, A., Graham, R. and Howdyshell, C. (2001), Business to Business Online Purchasing: Suppliers' impact on Buyers' Adoption and Usage, *The Journal of Supply Chain Management*, Winter, 4-10.

Dolan, R.J. and Moon, Y (2000) Price and market making on the Net, *Journal of Interactive Marketing*, 14, 2, 56-73.

Easton, G. (Forthcoming), Marketing: A Critical Realist Approach, *Journal of Business Research*.

Evans, P.B. and Wurster, T.S. (1997), Strategy and the new economics of information, *Harvard Business Review*, Sept-Oct, 71-82.

Grover, v. and Ramalal, P (1999), Six Myths of Information Management: Information Technology Networks, Electronic Commerce and the Battle for Consumer Surplus, *MIS Quarterly*, 23, 4, 465-495.

Hardaker, G. and Graham, G (2000) Energizing your Supply Chain for ecommerce, *Proceedings of 16th IMP Conference*.

Holland, C.P. and Lockett, A.G. (1997), Mixed mode network structures: The strategic use of electronic communication by organisations, *Organization Science*, 8,5, 475-488.

Iacovou, C.L., Benbasat, I and Dexter, A.S. (1995), Electronic data interchange and small organisations; Adoption and the impact of technology, *MIS Quarterly*, 19, 465-485.

Johnston, W.J., Borders, A.L. and Rigdon, E.E., (2000), Electronic Marketing and Purchasing, *Proceedings of 16th IMP Conference*.

Lancioni, R.A., Smith, M.F. and Oliva, T.A., (2000), The Role of the Internet in Supply Chain Management, *Industrial Marketing Management*, 29,1, 45-56.

Leek, S., Turnbull, P.W. and Naude, P. (2000), Is the Interaction Approach of Any Relevance in an IT /e-commerce Driven World, *Proceedings of 16th IMP Conference*.

Lucking-Reilly, D. and Spulber, D.F. (2001), Business to Business Electronic Commerce, *Journal of Economic Perspectives*, 15, 1, 55-68.

Naude, P., Holland, C. and Sudbury, M. (2000), The Benefits of IT-based Supply Chains- Strategic or Operational? *Journal of Business to Business Marketing*, 7, 1, 45-67.

Nokkentved, C. and Hedaa, L (2000), Collaborative Processes in esupply Networks, *Proceedings of 16th IMP Conference*.

O'Mahony, S. and Barley, S.R. (1999), Do digital telecommunications affect work and organization? The state of our knowledge, *Research in Organizational Behavior*, 21, 125-161.

Resch, M (2001), Plenary Address, CommerceNet B2B Big Bang Conference Proceedings.

Riggins, F.J., Kriebel, C.H. and Mukhopadhyay, T. (1994), The growth on interorganisational systems in the presence of network externalities, *Management science*, 40, (8), 984-998.

Segal, R.L. (2000), Online Marketplaces: A new strategic option, *The Journal of Business Strategy*, 21, 2, 26-29.

Timmers, P (1999) Electronic Commerce; Strategies and Models for Business to Business Trading, John Wiley and Sons Ltd, Chichester, England.

Turban, E., Lee, J., King, D. and Chung, H.M. (1999) *Electronic Commerce; A Managerial Perspective*. Prentice-Hall, New Jersey.