

Electronic Commerce and the Future for SMEs in a Global Market-Place: Networking and Public Policies

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ABSTRACT. This paper explores three inter-related issues: globalisation; the role of small and medium sized enterprises (SMEs); and electronic commerce (e-commerce). A central question is whether e-commerce offers advantages to SMEs that may facilitate their access to global markets and help them overcome the disadvantages they face vis-à-vis large transnational corporations (TNCs)? The paper starts by briefly considering the extent of globalisation and its relationship to free trade. We then go on to consider recent developments in e-commerce, focusing on the key issue of e-payment systems. Differences in the requirements of large and smaller firms are identified, and we identify a number of key issues concerning access of smaller firms to e-payment systems and the (virtual) market place, and outline their implications for regulatory policy. Our analysis highlights the importance of network externalities, and institutional factors affecting trust and the relationships amongst different economic actors. This leads to a consideration of networking and public policies more broadly. One of the central conclusions of our analysis is that there are important synergies between e-commerce (virtual) networks and (real) production networks. This suggests that policy makers and smaller firms should think in terms of extending existing, and catalysing new, real production networks to incorporate e-payment systems for networks of firms in order to facilitate their access to virtual markets.

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1. Introduction

Over the past decade a number of economic trends have emerged that are likely to significantly change the nature of industrial organisation as we approach the turn of the century and beyond. Three issues, in particular, that have aroused considerable discussion are: what is the effect of globalisation; what is the role of small and medium enterprises (SMEs)?; and what is the effect of electronic commerce (e-commerce)? In this paper we address each of these three issues and the relationship between them. Our particular concern is to consider whether e-commerce offers new opportunities and economic advantages to SMEs that may facilitate their access to global markets and help them overcome some of the disadvantages they face vis-à-vis larger transnational corporations (TNCs). In addressing this we pay particular attention to electronic payment (e-payment) systems.

E-commerce encompasses the activities of internet service providers, internet access providers, telecommunications operators and other providers, including the providers of publishing initiatives and advertising, and most importantly, e-payment services, OECD (1997). Within these aspects of e-commerce, e-payment systems are central because: (i) the coordination of market economies relies on transactions that involve interaction between buyers and sellers, and thus on payment systems that facilitate exchange; (ii) without a means of payment it is impossible to access markets; (iii) within a market economy, a payments system is also a means of evaluating economic activity, see Picory (1997). This is not to deny that payment systems are not always the central issue within e-commerce; for example

coordination, management and control of supply chains using electronic data interchange (EDI) raises additional, interesting issues.

It has been suggested that e-commerce has fuelled globalisation. Although there is a widespread presumption that in recent decades the world's economy has been characterised by increasing globalisation, precisely what this means is unclear. A popular view, nevertheless, is that markets are now global, that everywhere large and small firms have (equal) access to markets that span the world, and that this is served by access to the internet and the use of e-commerce and associated e-payment systems. For example, a consumer in Europe interested in rare books may order a volume from a specialist supplier in North America, paying by credit card; the order and details of the credit card can be conveyed on the internet, hence the transaction (at least prior to delivery) can be completed in seconds.

In contrast the starting-point of our paper is that this is a distortion of reality, rather than in practice: (i) smaller firms tend to be excluded from international trade because of their difficulty in capturing export markets and their costs of trading overseas;¹ and (ii) markets throughout the world tend to be dominated by large global producers, the giant TNCs.² It is in this context that we are interested in the potential role of SMEs, and more particularly in the way in which this potential role may be influenced by the opportunities resulting from developments in e-commerce. We argue that whilst in the short run the power of the internet may favour smaller firms, the growth in e-commerce and the evolution of e-payment systems raises the possibility of greater domination by transnationals and of reduced openings for smaller firms. Nevertheless, appropriate public policies may avert this danger and lead to new opportunities. These policies would include: regulation of e-payment systems; competition and regulatory policies aimed at e-commerce; and policies, such as education and training to provide smaller firms with the knowledge to access new technologies and exploit e-commerce via intranets and other networking relationships. Such policies have implications for financial issues, as well as for the deployment of systems of e-commerce at regional and global levels.³

The paper is organised as follows. Sections 2

and 3 consider developments in e-commerce and focus on the key issue of e-payment systems. Differences in the requirements of large and smaller firms are identified, and we identify a number of key issues concerning access of smaller firms to the market place and to e-payment systems, and outline their implications for competition and regulatory policy. We consider network externalities, and institutional factors affecting trust and the relationships amongst different economic actors. This leads to a consideration of networking and public policies more broadly. Section 4 introduces the notion of synergies between e-commerce networks and production networks. The final section summarises our main arguments and highlights a number of the key issues concerning e-commerce and industrial organisation in the twenty-first century.

2. The growth of a new marketplace and the role of e-payment systems

Commerce and the internet

The internet market is undergoing an explosive growth. At the end of 1995, commerce conducted on the internet amounted to over US\$159 million in sales. Konvisser (1996) estimates that by the end of 1999 turnover will exceed US\$400 billion. Recent estimates by ENST suggest that Europe alone will have a turnover of US\$600 million by the year 2000. Not only is the dollar volume of trade exchanged on the internet exploding, but so too is the internet itself. In January 1996, the internet had approximately 9.5 million hosts (machines connected) which represented a 94 per cent increase over the same month in 1995 and a near 700 per cent increase over 1993. Of these new hosts, by far the most rapidly expanding sector is the ".com" domain, which represents commercial enterprises. There are currently approximately 2.4 million ".com" hosts representing just over 25 per cent of internet hosts.

In terms of the sale of goods, it appears that sellers have adapted the internet to their current modes of business by using the internet as a new means of reaching consumers. But it seems that firms have tended not always to move beyond their traditional modes of business to take full

advantage of the power of the internet. The consequence is that, in one respect, the short-run potential of the internet as a sales vehicle is inversely proportional to the size of the seller: the world-wide web may instantly transform a smaller firm into a global distributor; by contrast, large corporations that already have their distribution network in place often find the web to be a niche channel, with direct web sales registering only a fraction of their total revenue, as illustrated by the study of generic services on a population of 300 firms across Europe in Picory (1997a).

Against this, if a firm is to have access to the internet it requires appropriate training for its personnel (see for instance Nomisma's (1996) discussion of a firm operating in the printed circuits market) and this is often easier for larger firms as compared with SMEs. Accordingly this is an issue for public policy, where training is a key agenda item.⁴ Access also requires a firm to contract with service providers, access service providers and telecommunications providers. In recent years telecommunications providers have begun to dominate these relationships and smaller service providers have had to merge or make alliances with telecommunications providers in order to achieve or sustain profitability. According to analysis by Forrester Research Inc only 7 per cent of 45 service providers are profitable, in part because of the costs of accessing the network imposed by telecommunications operators. Examples of alliances between service providers and telecommunications operators include HOL and Cegetel, AOL with Cegetel and MSN with France Telecom. The significance of all this is that telecommunications providers have different relationships with large and smaller firms requiring access to the internet. This difference parallels the different relationships between large and smaller firms with banks; large firms typically obtain credit on more favourable terms. Likewise, large firms obtain access to the internet more cheaply than smaller firms as a result of economies of scale. Hence, one way round this problem might be for smaller firms to seek access together as a network. Again there is a powerful finance analogy, given the experience of mutual guarantee schemes amongst smaller firms seeking credit. The importance of small firm networking is something to which we will return subsequently

in the paper. Another possibility is that smaller firms cooperate with large firms and gain access via the latter, but this runs the danger of the large firm dominating the cooperation relationship, limiting the scope of the smaller firm to develop. A further aspect of e-commerce that raises issues for competition policy and regulation concerns the evolution of e-payments systems and their impact on competition. These issues are discussed below.

Opportunities for new payment systems on the internet

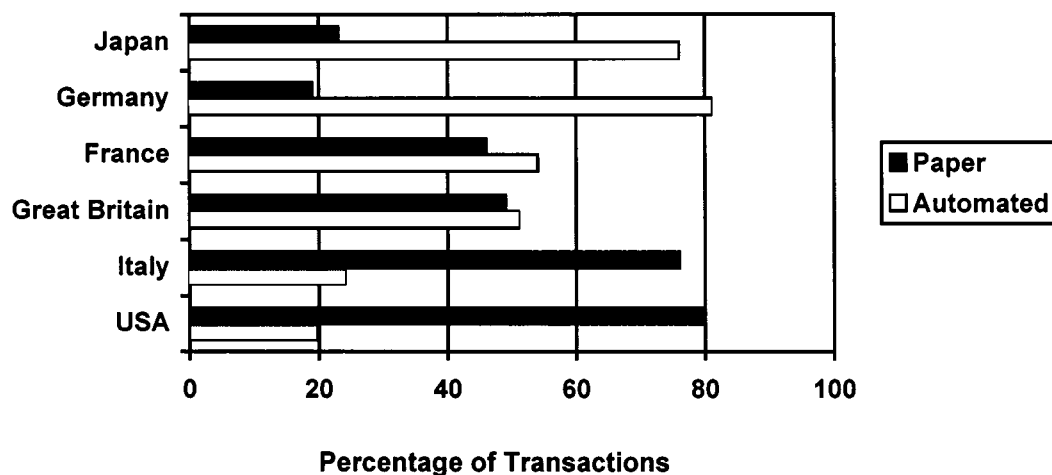
Electronically based payment systems are not a novelty. They have been in operation since the 1960s and have been expanding rapidly as well as growing in complexity. A mixture of different payment systems has evolved to service the growing requirements of both trade and non-trade related commerce. In the majority of cases – such as Swift (Society for Worldwide Interbank Telecommunications, a private network formed by International Banks) and Target (Trans European Automated Real Time Gross Settlement Express Transfer, a private network at the European level) – these systems operate as closed proprietary networks, creating incompatibilities between different systems. Moreover, there has been a particularly sharp division between the payment and settlement systems used for large value transfers (e.g. Swift and Target) and those available to settle smaller payments, for instance the traditional paper based banking system. This division is especially seen on a cross border basis and it has led to an inverse relationship between the value and the number of transactions handled electronically. Typically in most of the major industrialised countries, 85–90 per cent of the monetary value of business payments are processed electronically, while only approximately half of the total number of transactions are handled in this way. This is due to three inter-related factors: i) proprietary closed networks were developed by banks to handle large and increasingly internationally based payment systems; ii) large value payments are increasingly associated with foreign exchange and global securities transactions; iii) large value payment systems are not designed nor are they cost-effective for small value payments. The issues which concern the operators of the large value payment

systems are often different from those which are the focus of smaller traders. Banks which operate the former are increasingly concerned with the systemic risks which are associated with the huge monetary values involved.⁵ There is a move to more elaborate real time settlement systems which are inappropriate for the much smaller denominations involved in trading on a cross border basis by smaller firms. Similarly, the degree of direct central bank supervision required for the large value payment systems is much greater and contradicts the objective of minimising costs by achieving automation for low value payments. Smaller companies involved in making trade and related transfers are likely to require less direct supervision in order to achieve the lowest transaction costs and fastest transfers. This suggests an increasing divergence between large value payment and settlement systems used for a relatively small number of individual transactions, and the payment and settlement systems for a relatively large number of individual transactions typically undertaken by SMEs.

This argument leads to two further points. The first is related to the design of the international payment and settlement system and accentuation of the division between large TNCs and smaller enterprises as a result of large firms skewing innovation in their favour. For example, a significant proportion of global trade is controlled by

large TNCs operating within their own network of subsidiary companies, see for instance the discussion of evidence in Dicken (1998). Large corporations seek to minimise the costs of transfers within their operations while preserving the legal integrity and tax status of the companies concerned. Smaller companies, which do not have access to these networks, might be forced to rely on a paper-based system of documentary credits. These are generally very time consuming as well as costly to buyers and sellers alike. This leads to questions concerning smaller firms' ability to keep costs down and thus to access markets. If the demands of large firms skew innovations in e-payment systems in their favour, the relative costs of smaller firms will rise. This skewed outcome is also illustrated by the likes of France Telecom's telephone card, which gives users the possibility to pay for communication; the card constitutes a barrier for smaller telecommunications operators in France and elsewhere.

The second point relates to Figure 1, revealing the extent to which the means of payment in the major industrialised countries remains focused on paper based, non-automated practices involving a mix of correspondent banking, payment messaging via telex or SWIFT, checks and bank transfers, EDI or credit card payment systems. The savings in transactions costs associated with automated payments imply that there are efficiency gains



Source: Bank for International Settlements (1996a).

Figure 1. Scriptural means of payment, 1994, percentage of transactions.

associated with the greater use of automated payments systems. It follows that there is a need for trade and commerce related settlements systems to move to a more open systems environment, minimising transactions costs and opening up opportunities which follow when smaller scale transactions can be settled on a cost effective basis. According to the United Nations Conference on Trade and Development, the costs of paperwork and other complex formalities associated with cross border trade flows can amount to approximately 10 per cent of the final value of goods. A typical trade transaction involves several different parties and different documents, all of which have to be checked, transmitted, re-entered into various information systems, processed and filed. The Conference believes that this represents a major impediment to the growth of world trade, particularly for the industrialised countries. These transaction costs amount to more than US\$400 billion a year and they could be reduced by 25 per cent or more by streamlining procedures and extending the use of paperless trading, *The Financial Times* (1994).⁶ The internet offers the prospect of cutting this kind of cost and of a highly cost effective payment system for low value transactions. But all forecasts about the burgeoning marketplace becoming a significant characteristic of the world economy and smaller firms playing an increasing role can only be realised once the key problem, namely e-payment systems, has been addressed.

3. E-money, e-payment systems and virtual market places

Definition and analytical framework

A number of innovations are taking place in the area of retail payments known as electronic money (e-money). These innovations, which are still at a relatively early stage of development, have the potential to challenge the predominant role of cash for making small-value payments and could make retail transactions easier and cheaper for consumers and merchants.

The term e-money is often used loosely to refer to a wide variety of proposed retail payment mechanisms. We define e-money products in two types. The first refers to "stored-value" or "prepaid"

products in which a record of the funds or "value" available to a consumer is stored on an electronic device in the consumer's possession, for example: "Plug-in Payment Systems" attached to computers to enable payment for goods; token systems such as Digicash; or proprietary smartcards such as telephone cards. The electronic value is purchased by the consumer (for example, in the way that other prepaid instruments such as travellers' cheques might be purchased) and is reduced whenever the consumer uses the device to make purchases. In addition to the many existing single-purpose prepaid card schemes (such as those offered by telephone companies), e-money products are intended to be used as a general, multipurpose means of payment, for instance universal smartcards such as Mondex/Cybercash and C-Set. The definition covers both prepaid cards (sometimes called "electronic purses") and prepaid software products that use computer networks such as the internet (sometimes referred to as "digital cash"). From a policy point of view, the main interest in these schemes lies in who issues the prepaid value, how it is used as a means of payment and the impact on central banks' balance sheets, the banking industry and on consumers and merchants. The second type of e-money refers to "access" products. E-money as defined above differs from access products, which are products that allow consumers to use electronic means of communication to access otherwise conventional payment services (for example, use of a standard personal computer and a computer network such as the internet to make a credit card payment or to transmit instructions to make fund transfers between bank accounts). The significant novel feature of these access schemes is simply the communication method (for example the use of a computer network rather than a visit to a bank branch) and so, although they are of interest, they do not raise exactly the same concerns as e-money schemes (Bank for International Settlements, 1996).

In an e-payment system there are various significant and essentially discrete groups of interested parties, including:

- the users (subscribers), which include consumers and merchants;
- the issuers, i.e. banks and other financial or

non-financial institutions which are providing the mechanisms of payment or the means to integrate them into other financial systems. They receive funds in exchange for prepaid balances distributed to consumers – or create these balances by means of credit – and manage the float in the system that provides financial backing for the value issued to users. Their aim is to make profit via financing management of the float and via fees corresponding to the services which they provide.

Moreover, in an e-payment system three separate domains can be defined:

- the clearing and settlement domain, in which financial institutions, clearing houses and the central bank fulfil the interbank financial obligations resulting from electronic value transactions;
- the issuing/acquiring/operating domain, in which a structure is set up for issuing and acquiring electronic value as well as for interacting with the clearing and settlement domain; and
- the retail domain,⁷ in which the actual value transfers between users take place.

Given that the arrangements in the issuing/acquiring/operating and retail domains can vary considerably, it is not possible to give an exhaustive overview of all possible models of e-payment systems; for a typology of e-payment systems see Picory (1997). However, two simplified models are presented here which illustrate the arrangements that take place among the entities in the issuing/acquiring/operating domain as well as the degree of transferability of value in the retail domain.

Single-issuer systems

In the case of a single-issuer system, the flows of value are similar to those that take place in cash payment systems involving an issuing institution (central bank), the banking system and the retail system. A single issuer creates electronic value and issues it to participating institutions, typically banks. These institutions load electronic value onto their clients' (consumers') devices; this electronic value is used by consumers for payments;

merchants and consumers deposit these funds with their banks (participating institutions); the value is claimed by these banks from the issuer. The interbank payments resulting from transfers of electronic value are processed and effected in the clearing and settlement domain. In such a model, the issuer is typically the system operator and the participating institutions play the role of acquiring institutions. In the retail domain, consumers are allowed to transfer value freely between themselves (purse-to-purse transactions) and to merchants, but merchants are obliged to deposit the electronic value received as payments.

Multiple-issuer systems

In a multiple-issuer system, each issuer establishes a mechanism to create e-money and to issue this money to its clients (consumers); merchants receive payments from consumers; merchants deposit these funds with their acquirer; the system operator collects from the acquirers the claims on the issuers, consolidates those claims by issuer and transmits the relevant information to them; the interbank payments resulting from these claims are processed and effected in the clearing and settlement domain. In the retail domain, electronic value held by consumers can only be used for payment in transactions with a merchant; electronic value collected by merchants can only be deposited with acquirers. Consumers can deposit electronic value with their issuer.

Network externalities

The extent of the spread of e-money depends on the incentives for consumers, merchants and issuers to use it. The demand by consumers for e-money will depend on how the schemes compare with other payment methods in terms of the fees (if any) charged by issuers,⁸ the perceived security and privacy of e-money, the ease with which the e-money devices can be used, and the number of merchants accepting e-money. Merchants' willingness to accept e-money will be related to the size of fees imposed by the issuers or operators, the cost of terminals and associated training as well as the reduction in the cost to them of handling cash. Consider, for example, the competition between the Mastercard and Visa systems in

the last decade. Also, the differences between C-SET, an e-payment system that has low cost but no inter-operability and SET, which is the standard inter-operable system at the world level and which has been adopted by large firms but which is very costly because of equipment and processing requirements.⁹ These are factors whose influence varies with firm size. For example, the cost of a terminal may be at least as high in absolute terms for a smaller as compared to a large firm (and possibly higher, given large firms' procurement power); given smaller firms' difficulties in raising finance as compared to large firms this is an entry barrier preventing access to markets. Incentives for issuers include the revenues from any fees charged to consumers and merchants, revenues from the investment of the outstanding balances and, for bank issuers, cost savings from reduced cash handling (to the extent that e-money replaces cash). A possible disincentive could be the cost of meeting any existing or expected future regulation.

As far as both consumers and merchants are concerned, a key factor is their willingness and ability to adopt new technology. In its turn this is related to education and training, which again varies with firm size; where the merchant is a large firm it may have the resources to educate and train its personnel in-house but smaller firms tend to lack resources and face higher training costs. Hence there is a role for public policy in this regard. Most observers seem to believe that the spread of e-money products will be moderate in the short to medium term but could become more extensive in the longer run.¹⁰ With regard to their potential use and growth, card-based products are being designed to facilitate small-value payments in face-to-face retail transactions and therefore constitute a close substitute for banknotes and coins.¹¹ Software-based schemes will be used to make remote payments over computer networks, primarily the internet. They are likely to substitute for both cash and, to some extent, other cashless payment instruments such as cheques and funds transfers.¹² Since e-money is being promoted mainly as a substitute for cash transactions, many schemes set a relatively low limit on the maximum value that can be held by the consumer. Even where there is no such limit, factors such as the security of the schemes and any loss of interest

compared with holding funds in other forms will continue to be important in determining whether consumers are willing to hold large e-money balances.

However, there exist other criteria for the adoption of a payment system. These are linked to the network configuration of the system. In order for a large system to work as efficiently as possible, all users have to embrace the same standardised protocol or an inter-operable protocol. Moreover, *ceteris paribus* the more people using the same protocol and connected by the same network, the more value each user acquires from the system as a whole because a user has more people with whom it can communicate. The adoption of a singular payment system is affected by the number of agents taking equivalent action (i.e. there are clear network externalities). Furthermore, in a multiple-issuer system in which each institution is interested in printing its own proprietary version of e-money and following its own proprietary rules, consumers are hesitant to use a particular mechanism unless the devices are widely acceptable by merchants, while retailers hold back on their investments in equipment unless the mechanism becomes widely acceptable to consumers or until they know which kind of mechanism(s) is (are) the most popular with consumers. In short, network externalities are an issue for particular mechanisms within a system, hence for the system as a whole; users hold back on adopting particular mechanisms, and thus hold back on adopting the system.

Size differences across merchants and retailers are extremely important in determining the outcome of this situation. There are fixed costs to participating in payment networks. Large merchants are more likely to have the resources to join various mechanisms compared to small firms, which tend to face more financial constraints. Hence large firms may capture greater market shares whilst smaller firms are effectively denied access to markets. This should also all be seen as a dynamic process. It takes time for issuers and users to learn about and develop mechanisms, and whilst large firms may be able to join various mechanisms simultaneously, if smaller firms have to wait for development to occur before they can commit their more limited resources, the time involved may be time lost in establishing long-run

relationships with consumers. Furthermore, precisely because of their size and associated market power in buying and selling, large retailers and large merchants may influence the paths of technological change and innovation in favour of their preferences. For example, one mechanism in a multi-issuer system may have high fixed costs but the potential for very high economies of scale (as with SET), whilst another mechanism may be characterised by low fixed costs and no scale economies (for instance, C-SET); large firms may prefer the former – not least because high fixed costs form an entry barrier that might permanently exclude rivals from the market – and smaller firms the latter – since their trade volumes mean that scale economies are not realisable in any case. Yet development of the high fixed cost mechanism may be advanced more rapidly because large merchants and large retailers give it their backing; monopoly and monopsony power in product markets is used to require traders to adopt certain mechanisms.

Here, important parallels can be drawn between the evolution of e-commerce and e-payments systems, on the one hand, and new technology and traditional banking systems, on the other. History is replete with examples where inefficient technologies have emerged as dominant. The QWERTY typewriter keyboard (designed to slow down typing speeds to prevent mechanical keyboards jamming) and, arguably the Microsoft operating system are cases in point. The importance of sunk costs in training, the existence of network externalities and elements of monopoly power combine so that economies “get stuck” on a sub-optimal equilibrium path. In the case of e-payments systems parallels can be drawn with the evolution of traditional banking systems. Historically, many banks issued bank or promissory notes but the existence of network externalities (which arise partly as a result of the common need for trust, and partly as a result of the desirability of widespread acceptance) imply that there are strong efficiency gains associated with a system that has a central issuer that also acts as lender of last resort (Goodhart, 1985). In the case of the design of e-commerce systems, the lesson from history is that regulation is needed to ensure that, where possible, the most efficient technologies/systems become standard. Likewise in the

case of e-payments systems, experience from the evolution of traditional banking systems suggests there are gains to be had from regulation of the design of e-payments systems and the issuing of e-money.

Inter-system relationships and virtual market places

As different e-payment systems develop it is not certain how they will or can relate to each other, or to the traditional banking system. This raises queries about the requirements of smaller firms, thus about competition and regulatory policy. With e-payment systems firms and potentially not banks are creating their own exchange systems. With a single-issuer system, users exchange goods and services in return for credits useable within the system with or without the intermediation of the banking sector, but not necessarily useable outside the system. Access to such systems and thus to markets covered by such systems may be effectively denied to smaller firms. For example, in the case of an e-payment system that is closed – such as the payment system Globe ID, linked to the virtual market Globe Online – there is no link with other e-payment systems or with the traditional banking system. When a good is traded between two users of the system through the virtual market place, the seller receives a credit which can be used to purchase a good from another user of that system. For large firms dealing in many products and with the financial resources to await “real” payment, this may pose no problem. In contrast, for a very small firm, dealing with one product and for whom no other user of the e-payment system is offering supply of a desirable good – the credit is effectively worthless. This situation cannot arise, of course, with transactions underpinned by the traditional banking sector; in that case, payment can always be realisable in the form of cash or other credit useable as a means of exchange in an extremely wide set of circumstances.

E-commerce is developing in a rapidly changing environment. What is clear, however, is that a number of issues must be addressed by policy-makers and business-people if systems of e-commerce are to develop efficiently. In particular, measures should be taken to ensure that the

current and developing e-payment systems establish financial procedures which enable equal access by smaller firms. To the extent that the payment systems do not have such procedures they need to be scrutinised and regulated by appropriate competition and anti-trust authorities, with accompanying measures to ensure smaller firms' presence in the market place. This raises issues not only for the relevant competition authorities within geographical regions, for example within Europe, the U.S. and Japan, but also, given global electronic networks, it raises issues across regions. Moreover, access in theory is not access in practice unless the smaller firms have the accompanying and essential technology and knowledge; the deployment of e-payment systems involving smaller firms therefore requires education and training of smaller firms' personnel, for example.

Networking amongst smaller firms

In addressing such issues, a particular concern is the potential for identifying and stimulating suitable networks of smaller firms. This is in line with the European Union's stated objective to support co-operation amongst smaller firms.¹³ The problems we have identified focus, for instance, on smaller firms' lack of access to e-payment systems dominated by the current global corporation. This should be addressed by examining systems created and developed for networks of smaller firms. As e-payment systems become more important, if smaller firms are to be more than marginal players in the world's economies it is inappropriate to consider the role of each smaller firm in isolation. Rather, there are positive externalities from groups of smaller firms acting together. Such a group may have more credibility to obtain access to a particular system as a group, because together the firms have more to offer other users of the system, and together they have more to offer each other as regards use of credits obtained within such a system. In addition, together the firms can share the costs of acquiring the technology and knowledge allowing access to a system. For instance small firms typically lack the resources to carry out in-house education and training that is necessary to set-up and participate in e-commerce and associated e-payment systems.

If a group of small firms co-operate they can share the costs of establishing education and training for e-commerce across the network. In this case, the provision of education and training *necessitates* networking.¹⁴

However there are again significant public policy implications. For groups of smaller firms to work together in this regard, policy must stimulate such interaction, must make firms aware of the potential need for interaction and must enable such activity to occur. Paradoxically, the new technology underlying e-payment systems and developments in e-commerce more generally which imply the need for smaller firms to form networks, can also facilitate such networking by easing communication channels between firms. Sharing knowledge and accessing technology can be made easier by the new technology; for example, the establishment of *intranets* is important in this context. This is also something which public policy should address; there is a need to stimulate smaller firms' use of new technology thereby to stimulate smaller firms to create networks enabling them to develop and access e-payment systems.¹⁵

4. Production networks and e-commerce

Our comments about networking among smaller firms in the context of e-payment systems and virtual market-places lead to broader considerations: they raise questions about the role of e-commerce in the formation of production networks, hence queries about synergies in creating appropriate networks which span production processes, e-payment systems and virtual market-places.¹⁶ These are considerations largely ignored in earlier work, see the overview of discussions reported in European Commission (1996). By a production network we mean a group of firms which co-operate over such input activities as finance, training, research and technological development, product design, marketing, export promotion and distribution.

Leaving aside e-commerce, for the moment, if smaller firms are to be more than marginal players in the economies of the future, there is ample theoretical and empirical evidence pointing to the need for these firms to co-operate in particular forms of production networks, at least in certain

circumstances. For example, Oughton and Whittam (1997) have shown that networking enables SMEs to gain access to external economies of scale; SME networks have also been highlighted in discussions of successful innovation.¹⁷ Moreover, if it is accepted that production networks are important for the future of smaller firms in a global economy, the role of public policy needs to be considered. Over recent years economists and policy makers have paid increasing attention to the necessity for proactive policies to stimulate and establish appropriate networks.

In this context, it is important to recognise the impact of e-commerce: depending on the circumstances, e-commerce may either facilitate or undermine the creation of production networks, hence the role of smaller firms in a global marketplace. There are many types of production network in practice and there is some experience of e-commerce facilitating network activity. For example, on the one hand there are networks dominated by a leading company, often a large firm although possibly an SME, which sets the rules for being in the network. In the traditional supply chain oriented to mass production – as seen in the vehicle sector – the subcontractors are often “mono-client” and network membership is relatively fluid. In this situation, e-commerce can reduce communication costs and lead times, without altering the vertical power relations within the network. In addition, networks, characterised by leaders can be focussed on customised production, with membership depending more on quality, reliability, skill and coordination. Here, e-commerce tools are used for selecting members. Information and communication technologies are significant; they provide formats for assessing quality, etc. Such networks characterise traditional vertical supply chains. Often, forms of e-commerce, such as EDI, are used to select members, bringing rigidity to the network, EDI is mostly adopted in the internal networks of large company leaders and is consequently extended to the external networks of SME suppliers.¹⁸ While EDI systems have been initiated and designed primarily by, and for larger companies, the Electronic Commerce Association (ECA) has set up a code of practice (as part of the U.K. Department of Trade and Industry’s Information

Society Initiative) to ensure that SMEs can benefit from EDI (Euronews, 1997). However, it is unclear whether this code will become standard, how it will be enforced, and the extent to which it will remove all of the anomalies between large and small firms operating in vertical supply chains.

On the other hand, e-commerce tools can be used as part of the process of creating a horizontal network of SMEs with complimentary businesses, cooperating to produce a particular good or service. As a whole, the network of SMEs constitutes a “virtual company/group”. What makes the difference with the traditional, vertical supply chain is that the firms are in the network because of a reciprocal trust relationship assuring skill and quality, and because they jointly participate in the design and production process as independent parties; insofar as there is a “leading” company, it is a coordinating partner in a network of peers.

If SMEs are to play a significant role in any global marketplace in the future, it is these horizontal networks that the literature on industrial districts and networking identifies as important. Within this, also initially important is e-commerce, not least because one of the most critical issues is coordination and this requires a well structured system able to reduce communication costs and to couple modified business processes (such as sharing knowledge, joint design) with a convergence on the product, without this being rigidly imposed by the pattern of an organisation. For example, a key feature of horizontal production networks is communication amongst personnel and production units spanning geographical space. In the case of Italian industrial districts this feature is revealed by Brusco’s (1990) comments:

production in an industrial district is carried on as a social process by virtue of a social structure that encourages interaction amongst thousands of people. In order to achieve a capacity for invention and innovation . . . it is essential that many people understand the technology with which they work. This in turn requires continual informal interaction in cafés and bars and in the street. In this way new ideas are formed and transmitted (p 16).

One view is that electronic communication systems facilitate the communication between firms across geographical space where otherwise such communication is infeasible or too costly; use of the internet, video conferencing and other techniques open up new boundaries. In this spirit,

UNIDO's SPINET initiative is currently attempting to foster networking amongst smaller firms using a website (www.clusters.org) to encourage information exchange, inter-firm communications, etc. See also examples reported in Nomisma (1996), such as the Italian furniture manufacture with 40 employees using an intranet to improve efficiency in its relationship with suppliers; and the European supplier of paper and plastic containers, using EDI and the internet to improve communication and efficiency in its horizontal network. Furthermore, a key feature of Italian industrial districts and successful horizontal groupings of smaller firms in the past has been the geographical proximity of the firms, their presence in a particular locality, but e-commerce may be seen as altering the meaning of "locality". Indeed, the new technology may enable production networks to span national boundaries, multinational groupings being made all the more feasible; this is also an aspect of the SPINET project, which aims to create partnerships amongst clusters of SMEs in different parts of the industrialised world.

Against this, however, communication in successful production networks has not simply been an issue of a communication channel. Personal relationships, personal contact and personal interaction have been vital. Indeed this is reflected in the comments from Brusco regarding a social process, a point reinforced by Bianchi (1993): "the lesson derived from the Italian district analysis is that endogenous growth stems from the development of a local community, which is able to reinforce productive connections within a solid social context. Policy has to pay attention to both these elements" (pp. 26–27). Related to these comments is the significance of trust.

Trust is an important factor in establishing successful innovating groups; not least, it is argued that trust reduces transactions costs and establishes a foundation for co-operative relations.¹⁹ In well established groups trust among members seems to have developed through their shared experiences, common training, and adherence to the same normative structures. Evolving such trust is not something which can be achieved by the development of electronic communication alone. It requires interaction in more personal ways. Whilst the ability to communicate electronically

may be an instrument facilitating the evolution of such relationships, it is certainly not sufficient and perhaps it is not necessary, even for the creation of production networks which span national boundaries. In fact, the view that the presence of trust does not necessitate the use of e-commerce can be implied from the role of the banking system in ensuring trust in the relationships that existed between buyers and sellers before the advent of e-commerce. For example, by ensuring that the cash used as payment has been legal tender, the banking system has enabled buyers and sellers to trade with confidence; they held trust in the means of payment.

Moreover, the deployment of e-commerce systems may undermine the possibilities for evolving successful production networks. Precisely because they have the ability to use the new technology, firms may be content to rely on such techniques for their communication, which may make them fail to cultivate more extensive personal relationships. Without the need to come face to face, without even the need to hear each other's voices, representatives from different production units may engage in business. However, impersonal business transactions conducted electronically may fail to engender the trust which is known to be of key importance in facilitating business transactions, see Dei Ottati, 1994. It is the development of trust through repeated interpersonal business relationships that in a wider context may underpin the creation of horizontal production networks and thus open far more business opportunities. Hence, while the use of e-commerce may widen the arena of market transactions, the value of these transactions may fail to lead to the development of the further and more extensive networks that are known to yield external economies of scale. These opportunities may be undermined by the use of e-commerce.

Again, there is a need for public policies to recognise and address these issues. Insofar as the deployment of new technologies hinders the creation of horizontal production networks, policies are needed to offset any negative effects; insofar as deployment of the new technologies is insufficient, policies are needed to supplement their role; and insofar as deployment of the new technologies facilitates the creation of horizontal production networks, policies are needed to

stimulate their advantages. For example, it is widely recognised that the education and training of smaller firms' personnel is vital: in a global market place this includes education and training in the appropriate use of e-commerce systems, the opportunities they offer and the dangers they pose, the ways of seizing those opportunities and avoiding potential disadvantages.

Synergies in creating networks

We have argued the need for e-payment systems to be created and developed for networks of smaller firms. We have referred to the need for smaller firms to create horizontal production networks if they are to thrive in the economies of the future. Furthermore, we have pointed to a role for public policy in initiating and evolving such activities. What we would also argue is that there are synergies in tying together the creation of these different sorts of networks.

Networking among smaller firms either to create their own e-payment system or to join another system as a collective implies the firms co-operate with each other. Effective co-operation is served by the firms trusting in each other, and is certainly dependent on their awareness of opportunities to work together for mutual benefit. Likewise, the formation of production networks is based on co-operation, trust and mutual awareness. Hence the successful creation of each sort of network is related to similar factors. This points to the desirability of smaller firms thinking in terms of creating microprocesses, which encompass e-payment systems, virtual markets and horizontal production networks. There are significant externalities and economies of scale in evolving these activities together, for instance the development of trust in one of the activities serving the development of trust in the others. Moreover, complementarities in the provision of different services (e.g. training, R&D and marketing) within networks might realise significant economies of scope.

Similarly, there is a strong argument for policy-makers thinking in these terms. Most economies provide policies to support smaller firms and frequently these are subsidy-based. Such policies have tended to focus on firms as separate entities, not as a part of a network. In contrast, our dis-

cussion points to a new direction for policy, to an approach based upon networking across a range of activities and furthermore to an approach which both takes account of and builds on the emerging trends in e-commerce. These trends pose potential disadvantages but also raise opportunities, not least in creating networks which span national boundaries.

5. Conclusion

As economies move into the twenty-first century the emerging role of e-commerce raises pressing issues for businesses, policy-makers and researchers alike. If SMEs are to thrive and prosper in a changing market-place these issues take on a particular dimension. This paper focuses on the role of SMEs in a world characterised by increasing globalisation and discusses some of the key issues concerning the impact of e-commerce. Our discussion began with a consideration of financial issues and e-payment systems. It then broadened to other concerns, where we continued to analyse and question the economic impact of the deployment of different systems.

The emergence and growth of e-commerce has the potential to offer SMEs a means of access to global markets. However, it is also evident that the growth of e-commerce and e-payment systems can create disadvantages for SMEs. In one respect, the short run power of the internet as a sales vehicle is inversely proportional to the size of the seller but changes in the relationships between service providers, access service providers and telecommunications providers are favouring large firms. Moreover, the development of trade and commerce is inextricably associated with the development of e-money and e-payment systems. In most of the major industrialised countries, 85–90 per cent of the monetary value of business payments is handled electronically, while only approximately half of the number of transactions is handled in this way. Further, the issues which concern the operators of large value payment systems are often different from those which are the focus of smaller traders. This suggests an increasing divergence between the large value payment and settlement systems used for a relatively small number of individual transactions, and the payment and settlement systems used for a

relatively large number of individual transactions. In addition smaller firms which do not have access to the trading networks of large TNCs might be forced to rely on a paper based system of documentary credits that is time consuming and costly compared to the electronic system developed by and for TNCs, disadvantaging smaller firms in their attempts to access markets. We suggest that trade and commerce related settlement systems need to move to a more open systems environment, minimising transactions costs and opening up the opportunities which follow when smaller scale transactions can be settled on a cost effective basis.

As for e-money, its spread depends on the incentives for issuers, consumers and merchants to use it; these incentives may vary with firm size. It is also the case that the adoption of e-payment systems depends on network externalities, where again size differences across merchants and retailers matter, and hence access to such systems may be effectively denied to smaller firms. To the extent that current and developing e-payment systems are not and will not enable appropriate access to markets by smaller firms, they need to be the subject of scrutiny and regulation under competition policy. Furthermore, access by smaller firms to e-payment systems requires a public policy to ensure that their personnel be appropriately educated and trained. We advocate examination of e-payment systems specifically created and developed for networks of smaller firms, and public policy to stimulate such interaction. The new technology underlying developments in e-commerce can facilitate such networking by easing communication channels between firms but again public policy is necessary to stimulate firms use of this new technology.

More generally, mechanisms of e-commerce may open new possibilities for the creation of the horizontal production networks which are arguably vital if smaller firms are to realise external economies of scale and compete with larger firms on more equal terms. The new opportunities offered by e-commerce may enable production networks to span national boundaries, multinational groupings thereby being made all the more feasible. However, the ability to communicate electronically is certainly not sufficient and perhaps is not necessary for the creation of effective

production networks. Moreover, the deployment of e-commerce systems may undermine the possibilities for evolving successful production networks. Again, there is a need for public policies: insofar as the deployment of new technologies hinders the creation of horizontal production networks, policies are needed to offset any negative effects; insofar as deployment of the new technologies is insufficient, policies are needed to supplement their role; and insofar as deployment of the new technologies facilitates the creation of horizontal production networks, policies are needed to stimulate their advantages. Finally, there are synergies in creating different sorts of networks, hence it is desirable that smaller firms and policy-makers think in terms of creating microprocesses which encompass e-payment systems for a set of firms, virtual markets for that same set, and a corresponding horizontal production network.

Overall, we are far from pessimistic about the future; we see e-commerce as opening new horizons, but horizons which will only yield the most desirable outcomes if suitable public policies are designed, implemented and evolved. It is the design, implementation and evolution of these policies which is one of the real challenges facing businesses, policy-makers and researchers.

Notes

¹ See the general comments (albeit not as regards e-commerce) on barriers to exporting faced by European SMEs in ENSR (1995).

² See Cowling and Sugden's (1998) characterisation of the transnational organisation of production and trade, drawing on the United Nations (1993) discussion of TNCs, seen as "central actors" in the world economy.

³ By "deployment" we are referring to the extent to which systems of e-commerce are used and accessible. Financial issues and deployment are two topics concerning the G7, see European Commission (1996).

⁴ Of course, this arises as a result of well-known free rider and public goods arguments.

⁵ Because large payments – a typical amount would be US\$3 million – are settled on a daily basis, banks run up large and unmonitored overdrafts during the day, exposing members of the system to the risk that one might fail before payment has been completed, with a dependence on unwinding payments as the remedy for failure.

⁶ The inability to establish cost effective cross border payment systems has become a major political issue in the European Commission given the aspirations for the creation

of the Single Market. It is estimated that every year individuals and SME's make more than 200 million cross border payments within the Community. A recent study has revealed that costs are high and services poor. The study was based on a sample of 176 transfers, each equivalent to ECU 130. The study found that banks required time consuming bureaucratic paperwork, frequently overcharged payment transfers and took as long as three weeks to effect payments. Telegraphic transfers frequently proved no faster than bankers drafts sent by post. Charges in a number of cases were equivalent to 20% of the value of the ECU 130 payment (*The Economist*, 1992).

⁷ In this general model, no functional distinction is made between the users of electronic value (consumers and merchants); electronic value can be freely transferred among these users. This situation is for the moment theoretical.

⁸ The payment of interest on e-money balances held by consumers could potentially offset the effect of fees but, although this would be technically feasible, no schemes have announced any such plans.

⁹ See *La Lettre du Commerce Electronique*, 15 June 1998, Number 29, Page 10.

¹⁰ One special case might be the European Union, where e-money could conceivably gain ground during the period between the proposed start of monetary union (1999) and the date when notes and coins denominated in euros are likely to become available (2002). In the transition period, e-money denominated in national currencies and euros could be used interchangeably.

¹¹ Developers of card-based schemes typically aim at transactions smaller than US\$20, for which an on-line authorisation, as in the case of debit or credit card transactions, would be too cumbersome and costly.

¹² At present, card-based schemes are generally at a more advanced stage of development so that their features are better understood. In principle, e-money products might be used for payments of all sizes as an alternative to either cash or other payment instruments.

¹³ See the Commission's 1994 White Paper on *Growth, Competitiveness and Employment*, the subsequent *Integrated Programme for SMEs*, and the *Craft Sector* and Oughton and Whittam's (1996) discussion of these aspects of European Union industrial policy.

¹⁴ This relates to the experience in collective provision of production inputs in the Third Italy, an issue raised in later sections of this paper. See for example Brusco's (1982) description of industrial districts in the Emilia-Romagna region: "small firms might experience difficulties in book-keeping, in obtaining raw materials, and in obtaining credit at the same price paid by large firms with greater bargaining power. But in this context it is extraordinary to observe how the artisans and small enterprises of Emilia-Romagna have overcome the difficulties by creating associations to provide these administrative services and to co-ordinate purchasing and credit negotiations, thus establishing on a co-operative basis the conditions for achieving minimum economic scales of production" (p. 173).

¹⁵ Earlier, we highlighted smaller firms' higher costs compared to large firms in accessing the net. A response could be for SMEs to operate together as a network and to establish an intranet via a service provider. The idea would be to

connect "as one" to the internet with the service provider negotiating access terms with the telecommunications operator. However, if service providers are taken over by telecommunications operators, as appears to be happening, there is an important role for public policy in ensuring creation of appropriate intranets in networks of SMEs.

¹⁶ Our focus in this paper is on particular networking relationships between smaller firms. These are not the only determinants of smaller firms' success in the global market-place and other determinants may be analysed in similar ways. For example, Mason and Harrison (1997) discusses the matching of business angels and smaller firms, and the consequent need for information flows between economic actors; we would argue that developments in e-commerce may facilitate or undermine such flows, depending on the circumstances.

¹⁷ See, for example, Becattini (1990), Bianchi (1993) and Brusco (1982) on Italian industrial districts; Lundvall (1992) on "systems of innovation"; and Miller and Sugden (1995) and Sugden (1997) on "webs".

¹⁸ One view is that these suppliers are not external to the large firms at all, rather they are an integral part of a large firm hierarchy, see Cowling and Sugden (1998a).

¹⁹ Miller and Sugden (1995), Oughton and Whittam (1997).

²⁰ See for example Storey's (1994) review of European policies to assist the small firm sector.

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