

Global Electronic Markets and Global Traditional Markets

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INTRODUCTION

The development of Internet technology has signified a general shift from electronic hierarchies toward electronic markets (Malone *et al* 1987). It also indicates a forthcoming change toward the global integration of fragmented electronic markets and traditional markets. For example, efforts are made in integrating electronic markets following international standards and technologies such as cXML (www.cxml.org) and xCBL (www.xcbl.org), semantic web (Berners-Lee *et al* 2001), WSDL (www.w3.org/TR/wsdl), RDF (www.w3.org/RDF), DAML (www.daml.org), OIL (www.ontoknowledge.org/oil), OWL (www.w3.org/TR/owl-guide) and XPM (Guo and Sun 2003e), and new practices are adopted to integrate traditional markets (e.g., US Postal Service) into online markets (e.g. www.usps.com). These changes are forming new global markets and adjusting market behaviours that are consistent with the principles of labour division (Smith 1976) and comparative advantages (Ricardo 1912). In this transformation, firms would be forced to concentrate on markets where each has comparative advantages over production and distribution, and avoid disadvantageous markets that lead to lower aggregate productivity and less efficiency. Underlying these may be more

fundamental changes in how firms collaborate with each other to adopt their market roles in global markets.

In this paper, we address the more basic issues of how integration technology is affecting firms and global market structures, and discuss the implications that these changes present for corporate strategies.

New integration technologies, evolved from the technologies of electronic data interchange, enterprise resource planning and supply chain management, have created privately owned and profit-oriented electronic markets (Guo and Sun 2003c), and are allowing closer global interoperations between market participants through the development of *global electronic markets* (GEM) and *global traditional markets* (GTM). Although integration technology is making both GEM and GTM more efficient, we argue that it will lead to an overall shift toward global division of labour and global collaboration in and between GEM and GTM. Some firms will be able to benefit from this shift by becoming global producers. Others will be able to benefit from providing global distribution services. Almost all firms and individuals will be able to benefit from the wider range of options provided by GEM/GTM that integration technologies induce.

A b s t r a c t

The demand of market globalization has raised the challenge of semantic inter-operation in and between traditional and electronic fragmented markets and driven the development of integration technology. This paper argues that by comparing the cost advantages of technical integration and internationalization in production and distribution, semantic integration technology will lead to an overall shift toward global specialization and global collaboration. In this shift, three important effects in terms of semantic integration effect, market-to-market collaboration effect and production specialization effect, brought by the increasing use of integration technology, will change the behaviour, role adoption and competition strategy of global market participants. The analytical framework for predicting this shift explains the historical changes and the emergence of global markets. The analysis has several important implications for firms to make correct corporate strategies of how to adopt roles to participate in competitive global markets by optimizing resource allocation and developing niche markets.

Keywords: electronic market, traditional market, integration, globalization

A u t h o r s

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The analytical framework, on which our argument is based, can explain the evolution of electronic markets in the past two decades, describe the interactions between markets, as well as predict the consequences of changing integration technology that might impact on our current market structures. In this framework, the term *electronic market* is assumed as a dynamic concept whose extension enlarges in time to reflect the new development of information technology especially integration technology, and is thus defined as a dynamic *common information space* (CIS) (Bannon and Bødker 1997; Schmidt and Bannon 1992) in which market participants continuously interact with each other by the aid of integration technology to achieve a common goal — to lower business costs and to increase revenues through the exchange of products and services (Guo and Sun 2003c). This assumption takes integration technology as a dynamic factor and a major technological force on markets, which can change the market behaviours and structures in the long run. Therefore, though there exist possible globalization obstacles that may obscure the prediction such as the drastic decline of IT corporate valuation and the increasing numbers of business failures in the high-tech sector since 2000 (Schlueter-Langdon and Shaw 2002), by examining the evolution of market structures in the past two decades, the general trend of markets could be explained towards the collaboration and specialization between GEM and GTM.

Our attempt to predict changes is based on a simple conceptual analysis rather than on systematic empirical studies, because the expected changes have not yet occurred on a large scale. Therefore, a conclusive test of our model and predictions will require further empirical and analytical work. In addition, besides integration technology, other important forces might affect global market structures such as capital flows. The possible consequences of these other forces are outside the scope of this paper, and are independent of the importance of integration technologies.

ANALYTICAL FRAMEWORK

Definitions of GEM and GTM

The emergent global economy is shaping two types of markets: global traditional markets and global electronic markets (Sawhney 2000). GEM (e.g., gemm.com) digitalizes production and distribution to provide GEM functionalities by collaborative integration of fragmented electronic markets and traditional markets. The market forces of GEM come from the demand and supply of global services generated by global market participants in both traditional markets and electronic markets. These forces determine design, price, quality and quantity of digital production and digital distribution. GTM (e.g., global car markets), on the other hand, physically

manufacture and distribute products and services for global markets. GTM optimizes the global production and global distribution by collaborating with GEM providers, such as purchasing digital products and services from GEM. Similarly, market forces of GTM result from the demand and supply of both traditional markets and electronic markets. An important distinction between the concepts of electronic markets/traditional markets and GEM/GTM is: the former is a dynamic concept whose boundary is enlarged with the development of integration technologies and practices while the latter is a static concept that expresses the result of the consolidation of existing fragmented markets.

Comparative advantages of market integration factors

Different markets have different relative advantages. Smith (1976) has theoretically proved that division of labour and specialization in production can increase productivity. Ricardo (1912) has suggested the relative advantages of trades between different markets that have different productivities. Heckscher (1991) and Ohlin (1967) believe that the differences of factor abundances and endowments in different countries can bring comparative advantages for international trade by effective combination of resources. Based on these theories and our observations on the emergent and enlarging electronic markets, we hypothesize that there are also comparative advantages over GEM and GTM. The differences of integration factors determine that some markets are more suitable for producing and distributing digital products and services, while other markets are more capable of producing and distributing physical products and services. These relative advantages can be compared against the amount of costs for the same amount of profit between different markets. In this section, we discuss several trade-offs between GEM and GTM in terms of market participation such as global collaborative production and global collaborative distribution by a cost analysis of globalization.

Market globalization is a dynamic process of the collaborative integration of fragmented markets, which is performed by firms to minimize transaction costs for their self-interests (Coase 1988, 1993; Commons 1990 [1934]; Williamson 1975). In many cases of this process, *global collaborative production cost* is lower in GTM but higher in GEM, while *global collaborative distribution cost* is higher in GTM but lower in GEM. The former refers to the certain amount of input in production to obtain an expected amount of output for the global markets by collaborating with resources both in GEM and GTM. The latter refers to the certain amount of input in distribution to obtain an expected amount of output for distributing products and services to global markets by collaborating with resources in GEM and GTM. In GEM, production costs include software design, system

development, testing, usability studies and management overhead, while distribution costs include software and systems marketing and after-sale supports. In GTM, production costs include product design and manufacturing, while distribution costs involve purchasing/building electronic distribution systems for physical distribution. The categorization depends on the level of participation of GEM or GTM. There are many factors that could affect the cost and influence firms to make decisions for market participation, for example, global market niches (Reynolds 1993), global requirements (DePalma 2001), firm size (Guo and Sun 2003c) and available capital investments (Lloyd 1996).

Among many cost factors, two specific factors that can be changed by integration technology are very important in determining the overall cost level of GEM and GTM: technical integration ability and internationalisation ability. *Technical integration ability* refers to the ability of integrating various fragmented electronic markets and traditional markets (e.g., Guo and Sun 2003e; Omelayenko *et al* 2002). It is the ability of contributing to the boom of GEM. Current electronic markets are fragmented, and each is a ‘semantic community’ (Guo and Sun 2003d; Robinson and Bannon 1991) in which firms share the same local perspectives in product representations, business processes, communication protocols, natural languages and subcultures. For example, fragmented markets, supported by Ariba (www.ariba.com) and CommerceOne (www.commerceone.com), are unable to semantically interoperate with each other, because they have adopted different industrial standards cXML (www.cxml.org) and xCBL (www.xcbl.org) (Guo and Sun 2003a, b). In a given integration technology, different types of firms may obtain different technical integration abilities. If the given integration technology requires more reengineering efforts and more capital input, large firms gain more technical integration abilities, for example, applying ebXML (www.ebxml.org) to reengineer the business processes. On the contrary, if the given integration technology requires less reengineering efforts and less capital input, small and medium sized enterprises (SMEs) are more likely to increase their technical integration ability, for example, XPM technology (Guo and Sun 2003e). Besides, the technical nature of the firms will affect the firms’ technical integration abilities. In general, Internet-oriented firms find it easier to apply the new Web-based integration technologies that are developed either by other firms or by themselves or by both, and thus could obtain higher technical integration abilities. For example, Amazon (www.amazon.com) could have higher ability to integrate various physical bookstores than non-online book distributors if they have certain well-developed integration systems. Depending on the different applicable situations, firms that have higher ability in technical integration are more likely to become GEM product and service providers

by enabling semantic interoperations between GEM and GTM, and to take comparative advantages of providing digital products, GEM services and infrastructures.

Internationalization ability refers to the ability for establishing international business relationships with customers by means of corporate images, public relations, management and cultural adaptation. This ability has removed socio-economic barriers across national borders, semantic communities (Guo and Sun 2003d; Robinson and Bannon 1991), legal systems and political regimes. This ability implies that those firms with special expertise and effective management could go global to take comparative advantages over global markets by specialization or collaboration. Though, often, large firms have higher internationalization ability, this does not necessarily mean that SMEs are in unfavourable situations. In fact, SMEs can obtain higher ability by concentrating on niche markets (Reynolds 1993) or maintaining good customer relationships. For example, many SMEs have penetrated into the global market by maintaining long-standing contracts with certain large international companies reinforced by either personal ties or corporate images such as the development of ACONSITe (www.aconsite.de) and Zhangguang 101 (www.101international.com). Therefore, other things being equal, internationalization ability determines the globalization costs and in turn determines the choice and weight of participating GEM/GTM.

Figure 1 shows the general situations of firms in the combinations of technical integration ability and internationalization ability. Nevertheless, it only describes the possible roles that firms will play. Like the examples given above, SMEs may move from left to right along the axis of internationalization ability. The final market positions of firms are determined by their corporate strategies in deploying integration technology, niche market, available capitals and customer relationships.

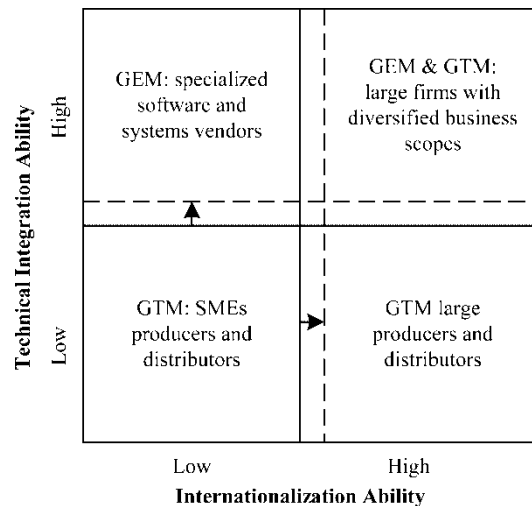


Figure 1. Globalization factors affect adoptions of market roles

EVOLUTION OF ELECTRONIC MARKET STRUCTURES

To illustrate the application of our analytical framework, we briefly examine the evolution of electronic market structures in the past two decades, paying particular attention to the effect of key integration technologies. Until the mid-1980s, market functions of production and distribution are still confined in traditional markets, though the systems for transaction processing, database management and decision making have already developed. By late 1980s, the rapid development of EDI technologies (United Nations 1987) indicates the advent of electronic markets. Some firms find their values as the EDI specification makers, electronic interconnection providers or EDI systems vendors such as Sterling Commerce (www.sterlingcommerce.com). These firms have become *EDI market facilitators* to provide all needed EDI services. At the same time, many firms that buy EDI services, install EDI platforms turn to be *EDI market users* such as Line56 (www.line56.com). A direct implication of EDI market establishment is that traditional markets have reduced transaction costs and increased market efficiency through interoperating with the emergent EDI markets, though these markets are confined within some large firms — some limited common information spaces. Figure 2(a) shows the simple EDI market structure and its interoperation with traditional markets.

The real electronic markets were formed in 1990s when many common information spaces over Internet for business interaction were enlarged. In this period, new Internet and browser technologies have triggered two subsequent important integration technologies: front-end technologies (human-oriented web integration) and back-end technologies (computer-oriented data integration) (Segev *et al* 1995). Front-end technologies lead to the development of electronic catalogues (Ginsburg *et al* 1999; Handschuh *et al* 1997; Keller 1996; Stanoevska-Slabeva and Schmid 2000) that include online shops, electronic malls and corporate user interfaces to internal enterprise systems and external

partner systems. Of them, some firms providing services directly to consumers and businesses become *electronic market intermediaries* (i.e., electronic retailers and electronic distributors), and other firms that provide Internet infrastructures (e.g., ISP) and electronic market supporting tools (e.g., vendors for ordering and payment systems) become *electronic market facilitators*. Consumers and firms beyond the above list become *electronic market users* that buy services, equipment and systems from both electronic market intermediaries and facilitators.

Back-end technologies integrate functionalities of enterprises both within firms in the form of enterprise resource planning (ERP) (Amice 1993; Bernus *et al* 1996; Williams 1993) and between firms in the form of supply chain management (SCM) (Bakos 1991; Clark and Hammond 1997; Christiaanse and Kumar 2000; Fisher *et al* 1997). These inter- and intra-enterprise integrations rapidly push many firms from traditional markets into electronic markets. For example, configurable ERP systems such as SAP, BAAN and PeopleSoft integrate information and information-based processes within and across functional areas of a firm through Intranet. SCM such as Commerx eProcurement System (www.commerx.com) expand the access of business resources from enterprise-wide to multiple associated partners. In the late 1990s, ERP and SCM were gradually merged through various integration tools such as enableNet (www.commercequest.com). Many large firms of traditional markets become faithful electronic market users by continuously purchasing enterprise integration systems. For example, analysts stated that 70% of Fortune 1000 firms have and will install ERP systems (Bingi *et al* 1999). Due to the increased adoption of ERP systems by firms in traditional markets, the interoperation and collaboration between traditional markets and electronic markets have been vigorously increased (Everdingen and Waarts 2003). In this context, a lot of new firms enter into electronic markets and become electronic market facilitators. This has led to an overall cost reduction of both production and distribution in both electronic and traditional markets.

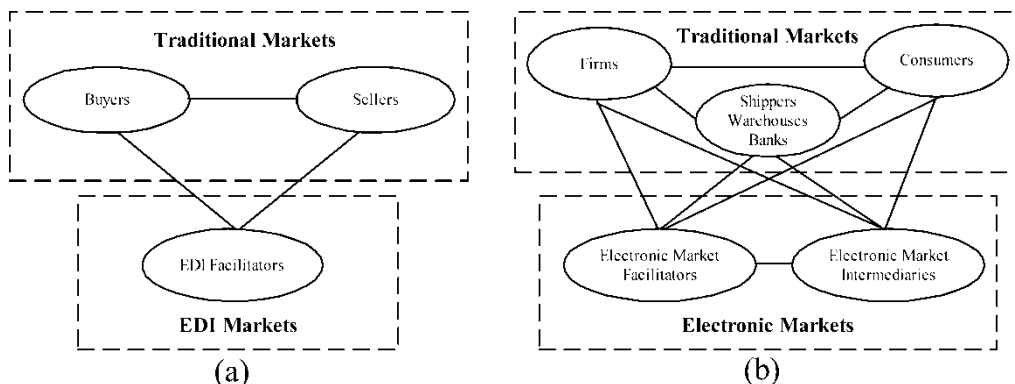


Figure 2. Comparison of EDI markets and electronic markets

Figure 2(b) shows the structural changes and inter-operations between these two markets, which are brought by the changes of inter- and intra- enterprise integration technologies. Contrasting with the EDI market, the electronic market is enlarged in terms of common information space. However, electronic markets of this period are still fragmented and cannot inter-connect with each other to meet the globalization requirements for trading products and services (Guo and Sun 2003d; Medjahed *et al* 2003), that is, they are still separated from each other.

EMERGENT GEM AND GTM

In inter-enterprise integration, an acute issue has been observed, that is, heterogeneous integrated enterprise systems have serious semantic interoperation problems. This issue largely prevents traditional markets and electronic markets from growing into global markets — GEM and GTM. Researchers have found that each supply chain system may be a separate ‘semantic community’ (Guo and Sun 2003d; Robinson and Bannon 1991) that is heterogeneous in product data (Fensel *et al* 2001; Guo and Sun 2003a), document models (Omelayenko *et al* 2002) and business processes (Dogac *et al* 2002). Numerous standards and reference models generate numerous heterogeneous electronic markets that prevent semantic interoperation between these electronic and traditional markets (Guo and Sun 2003b, c; Omelayenko and Fensel 2001; Medjahed *et al* 2003). Current technologies are not yet able to solve this semantic interoperation problem fully, because most existing integration technologies target at schematic or structural integration level and semantic integration studies are still in a beginning stage (Guo and Sun 2003b). Nevertheless, we argue that this unsolved issue would not prevent us from predicting the trend of GEM and GTM, in that some theoretical studies and practical experiments have already been made in solving the semantic interoperation problems to merge an integrated common information space. In the following, we discuss the initiative activities of semantic integration in terms of current researches on semantic web, market-to-market integration and virtual organization.

- Semantic web, which semantically integrates web services, is expected to be the next generation of Internet, enables semantic representation and sharing, and processes business data across semantic webs (Berners-Lee *et al* 2001; Ding *et al* 2002). They have envisioned a semantic web language tower (Patel-Schneider and Fensel 2002) that provides intermediate language standards based on XML as the universal syntax carrier. Escalating in the tower is the higher-level of metadata schemas such as RDF, ontology vocabulary such as OWL and rule languages such as

ruleML. It is discernible that semantic web intends to provide an overall semantic interoperation framework based on a collection of interoperable standards (e.g., those proposed and recommended by www.w3.org) to mediate fragmented markets.

- Market-to-market integration technologies endeavour to integrate global market functions between heterogeneous markets such as product data integration (Guo and Sun 2003a, b, d and e), business document integration (Omelayenko *et al* 2002) and business process integration (Bussler 2001; Dayal *et al* 2001) including ordering, payment and negotiation (Weigand *et al* 2003). These technologies address more the local contexts of individual markets and firms. They attempt to preserve the different local understandings of different ‘semantic communities’, but enable to dynamically interpret their local business data on a common context (Guo and Sun 2003d, e). Therefore, these technologies generally extract the individual business semantics of various markets and firms for specific level of business interaction, and use them for the inputs of the standards that semantic web establishes. The successful combination of semantic web and market-to-market integration technologies will enable semantic integration across fragmented markets in a wider scope and establish closer collaborative relationships on globally integrated markets.
- While the above two technologies could be combined for a better semantic integration of fragmented markets to provide more collaboration opportunities, virtual organizations (Mowshowitz 1997) and collaborative computing technologies (Schmidt and Simmon 1996) integrate enterprise functionalities that are distributed across the Internet to form integrated collaborative global enterprises. These technologies follow firm principles such as self-interest principle (Coase 1988, 1993; Commons 1990 [1934]; Williamson 1975). Under these principles, the design of these systems often takes the view of collaborative competition such as game theory (Heap and Varoufakis 1995) to minimize firms’ costs.

Besides cost reduction and efficiency increase, the emergent semantic integration technologies have important effects on firms’ participation in GEM and GTM. In particular, there is a *semantic integration effect*. This effect means that different fragmented markets or ‘semantic communities’ can communicate with each other no matter whether each has its different culture, language or legal system. This effect will benefit all firms for global production and global distribution, needing less consideration of internationalization ability. For example, electronic markets based on different standards of cXML, xCBL and ebXML can interoperate with each other (Omelayenko *et al* 2002). In addition, firms that have emergent requirements for various ad hoc personalized product representations are able to interoperate with each other (Guo and Sun 2003a, e).

Derived from semantic integration effect, another two effects are market-to-market collaboration effect and production specialization effect. The *market-to-market collaboration effect* is a natural consequence of semantic interoperation between the participants of both GEM and GTM. It means that market participants are able to work together across semantic communities to design, produce and distribute products in a virtual organization (Mowshowitz 1997). For example, this effect enables collaborative commerce (Phillips and Meeker 2000) for dynamic web-enabled exchange of business information and ideas between trading partners. It also enables integrated supply chain management, collaborative sourcing and procurement, customer collaboration, collaborative ontology editing, collaborative shopping and collaborative document editing.

Since semantic integration has brought tremendous market transparency for both GEM and GTM, firms are forced to adopt product differentiation strategies (Gazzale and MacKie-Mason 2001) to obtain relative advantages by specializing their production and distribution activities and by enhancing their niche markets (Reynolds 1993). This is the *production specialization effect* under the pressure of competition. This effect automatically optimizes the quantity and quality of production and distribution and is consistent with the labour division theory (Smith 1976), because, confronted with high competition, sellers have to continuously adjust their global market activities according to market demand and their expertise for survival and thriving.

The effects brought by semantic integration lead us to predict that the markets are shifting toward two specialized yet collaborative global markets: GEM and GTM. GEM globally produces and distributes digital products and services while GTM collaborates with GEM to consume or continue the physical part of production and distribution. Market makers play their globalization roles consistent with the principles of labour division and comparative advantages applicable for both GEM and GTM. The firms in traditional markets extend their

demand and supply to GEM, while firms of electronic markets create new demand and supply for GTM. As Figure 3 indicates, firms of both GEM and GTM collaborate and specialize their work to present an integrated global market, where almost all of them benefit from this emergent *dual-trading-arena* model.

This model indicates an expanded common information space brought by semantic integration technology. It reflects the dynamics of electronic market where its activity boundary is enlarged, its number of collaborative actors is increased, and its interactive contents are broadened. The quality indicators of this dynamic space could be classified into three aspects: the semantic linkability of the proposed international standards under the framework of semantic web, the preservation of personalized and contextual semantic contents of individual firms and markets that are situated in different semantic communities, and the healthy collaborative competition relationships between firms and markets that automatically increase the overall welfare of the whole society.

MOTIVES OF PARTICIPATING DUAL-TRADING-ARENA

In the context of dual-trading arenas, participants have different motives for expected benefits. As shown in Figure 3, there are five categories of market participants, and each has different expectations.

- 1 *Consumers*: Consumers now expect more comparable selections, cheaper prices, higher quality and more personalized services. For example, they are ordering products and services across country borders (e.g., www.amazon.com), and enjoying playing games with people thousands of miles away (e.g. www.netease.com). They are also able to combine face-to-face services and online services together (e.g. www.usps.com).
- 2 *Retailers*: The emergent globalization model provides an unprecedented opportunity for retailers to increase consumer numbers. It motivates retailers to satisfy consumers' individual requirements by all possible

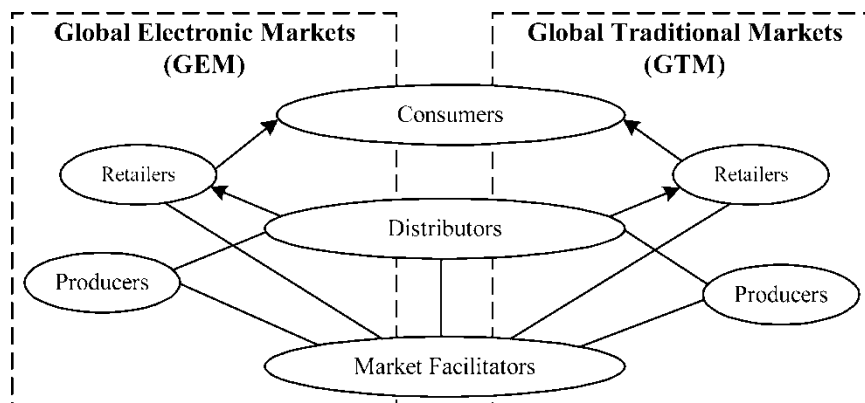


Figure 3. Integrated dual-trading-arena model

means. For example, some retailers are providing one-to-one marketing tools to meet consumers' personalization requirements (e.g., discussions in www.allen.com).

- 3 *Distributors*: Distributors are motivated to optimize their business by tightly collaborating with producers and market facilitators for shipping schedules, ordering, financing and after-sales services. For example, Trilogy (www.trilogy.com) in GEM makes agreements with firms of GTM to collaboratively deliver values to consumers by building alliances with automotive and communication industries.
- 4 *Producers*: In the dual-trading-arena context, two types of producers are detected: digital producers and physical producers. *Digital producers* are motivated to supply GEM with digital products, which is defined as final products for direct consumption, such as software, MP songs and digital books. Such firms are discussed in www.digitalproducer.com. *Physical producers* are those traditional producers of physical products and onsite services, which are motivated to enlarge market size and decrease production cost by introducing GEM services. For example, many producers are increasing their international trade opportunities by purchasing GEM services from www.alibaba.com.
- 5 *Market facilitators*: Market facilitators are a special group of service providers in both GEM and GTM. They are motivated to provide infrastructure of markets and secure the operations of markets. In GTM, banks, warehouses, shipping companies, Customs and taxation offices are market facilitators. In GEM, providers of Internet services, online financial services, logistics, security and legal services are market facilitators. For example, www.verisign.com supplies solutions for building secure digital enterprises. Different from digital producers, GEM market facilitators are indispensable. The missing of their functionalities will affect the stability and growth of both GEM and GTM. In contrast, digital producers are independent. The boom or recession of digital producers only affects the demand and supply of digital products, and will not endanger the existence of overall markets.

There may be some risks for all above market participants. The development of semantic integration technologies may be uneven for different firms. In a given development stage, a newly developed semantic integration technology is possibly only favourable to some of the firms. For example, XPM technology (Guo and Sun 2003e) is more favourable to SMEs and GEM facilitators to take comparative advantages over GEM. If large firms try to take the same advantages as SMEs applying XPM technologies, they may have higher labour costs. This implies that different market participants should correctly understand the emergent semantic integration technologies and make correct corporate decisions to leverage technical integration and internationalization abilities to

avoid the possible globalization risks according to the sizes of firms, financial status and technical capabilities. Second, the changes of politics, economics and acts of one or several countries may cause the fluctuation of GEM and GTM. This may result in an unexpected business loss even though the corporate decisions were made on rational bases. In addition, all firms should be aware that the emergent dual-trading-arena is more brittle and volatile and should be prepared with emergency business alternatives, because the semantic integration effect also quickly spreads negative news and rumours that are enough to break the markets in a moment. Nevertheless, the general trend is that the increasing semantic integration will shift our markets toward more cost-effective global markets.

CONCLUSIONS AND IMPLICATIONS

The semantic integration of heterogeneous fragmented markets is becoming important. The framework we have developed helps explain many of these changes. We have shown how the increasing use of semantic interoperations can be seen as the result of three forces: the semantic integration effect, the market-to-market collaboration effect and the production specialization effect. We have analysed how factors such as technical integration ability and internationalization ability affect role adoption in and between global electronic markets and global traditional markets. Finally, we have argued that, by pursuing the reduction of costs in both production and distribution, integration technology will lead to an overall shift toward higher specialization and collaboration in almost all global markets. By applying this framework, it is possible to see how many changes occurring today fit into a larger picture, and to predict some of the specific evolutionary changes that are likely to occur when integration technology becomes more widely used.

Our analysis has several implications for corporate strategy:

- Most firms should consider their niche markets to benefit from specialization by taking relative advantages over global electronic markets and global traditional markets.
- All market participants should understand that collaboration in and between global electronic markets and global traditional markets would reduce the costs of production, distribution and procurement.
- All market participants should realize the impacts brought by market transparency. For producers, product differentiation strategies should be considered to avoid the delivery of homogeneous products and services. For distributors and retailers, personalization should be focused to keep customer loyalty. For consumer treatment, notices should be made regarding online tracking, exposure of privacy and security policies.

- All firms should understand that global electronic markets are privately owned and provided by electronic marketplace providers. There exist risks if a firm's whole business is dependent on another firm. All firms should realize the 'brittle' essence of global electronic markets and increase adaptability to prevent possible disasters.
- Globalization always implies some level of uncertainty such as political and legal issues. All firms should prepare alternatives ways of market participation.

In short, if our predictions are correct, we could expect that the future world is more organized, more personalized and more specialized, but easier to panic if something is suddenly wrong in the electronically chained markets. To support these predictions, we need more systematic empirical studies and more detailed formal analyses. Nevertheless, we hope the framework we have presented will help guide this research.

References

- Amice, C. (ed) (1993) *CIMOSA: Open System Architecture for CIM*, 2nd edn, Berlin: Springer-Verlag.
- Bakos, Y. (1991) 'Information Links and Electronic Marketplaces: The Role of Interorganizational Information Systems in Vertical Markets', *Journal of Management Information Systems* 8(2): 31–52.
- Bannon, L. and Bødker, S. (1997) 'Constructing Common Information Spaces', *ECSCW'97*, 7–11 September, Lancaster, UK.
- Berners-Lee, T., Hendler, J. and Lassila, O. (2001) 'The Semantic Web', *Scientific American*, May Issue, <http://www.sciam.com/issue.cfm?issuedate=May-01>, accessed 15 April 2003.
- Bernus, P., Nemes, L. and Williams, T. J. (1996) *Architectures for Enterprise Integration*, London: Chapman & Hall.
- Bingi, P., Sharma, M. K., and Godla, J. K. (1999) 'Critical Issues Affecting an ERP Implementation', *Information Systems Management* 16(3): 7–14.
- Bussler, C. (2001) 'B2B Protocol Standards and their Role in Semantic B2B Integration Engines', *Bulletin of Technical Communication Data Engineering* 24(1): 3–11.
- Christiaanse, E. and Kumar, K. (2000) 'ICT Enabled Coordination of Dynamic Supply Web', *International Journal of Physical Distribution & Logistics Management* 30(3–4): 268–85.
- Clark, T. H. and Hammond, J. H. (1997) 'Re-Engineering Channel Re-ordering Processes to Improve Total Supply Chain Performance', *Production and Operations Management* 6(3): 248–65.
- Coase, R. (1988) *The Firm, the Market and the Law*, Chicago and London: The University of Chicago Press.
- Coase, R. (1993) 'The Nature of the Firm', in O. Williamson and S. Winter (eds), *The Nature of the Firm: Origins, Evolution, and Development*, New York and Oxford: Oxford University Press, 18–33.
- Commons, J. (1990) *Institutional Economics: Its Place in Political Economics, vol. I*, New Brunswick and London: Transaction Publishers (originally published in New York by Macmillan, 1934).
- Dayal, U., Hsu, M. and Ladin, R. (2001) 'Business Process Coordination: State of the Art, Trends, and Open Issues', in *VLDB Conference*: 3–11, Rome, Italy.
- DePalma, D. (2001) 'Which Markets First?', *E-Business Advisor Magazine*, January Issue, <http://advisor.com/Articles.nsf/aid/DEPAD03>.
- Ding, Y., Fensel, D., Klein, M. and Omelayenko, B. (2002) 'The Semantic Web: Yet Another Hip?', *Data & Knowledge Engineering* 41: 205–27.
- Dogac, A., Tambag, Y., Pembecioglu, P., Pektas, S., Laleci, G., Kurt, G., Toprak, S. and Kabak, Y. (2002) 'An ebXML Infrastructure Implementation through UDDI Registries and RosettaNet PIPs', *Proceedings of 2002 ACM SIGMOD International Conference on Management of Data*: Madison, Wisconsin, USA, 512–23.
- Everdingen, Y. and E. Waarts (2003) 'A Multi-country Study of the Adoption of ERP Systems: The Effect of National Culture', *ERIM*, ERS-2003-019-MKT, online at: <http://www.eur.nl/WebDOC/doc/erim/erimrs20030310111626.pdf>.
- Fensel, D., Ding, Y., Omelayenko, B., Shulten, E., Botquin, G., Brown, M. and Flett, A. (2001) 'Product Data Integration in B2B E-Commerce', *IEEE Intelligent Systems*, July/August: 54–9.
- Fisher, M., Hammond, J., Obermeyer, J. and Raman, A. (1997) 'Configuring a Supply Chain to Reduce the Cost of Demand Uncertainty', *Production and Operations Management* 6(3): 211–25.
- Gazzale, R. S and MacKie-Mason, J. (2001) 'Endogenous Differentiation of Information Goods under Uncertainty', in *EC'01: Proceedings of the 3rd ACM Conference on Electronic Commerce*, ACM Press, 75–84.
- Ginsburg, M., Gebauer, J. and Segev, A. (1999) 'Multi-vendor Electronic Catalogs to Support Procurement: Current Practice and Future Directions', in *Proceedings of Twelfth International Bled Electronic Commerce Conference*, Bled, Slovenia.
- Guo, J. and Sun, C. (2003a) 'Collaborative Product Representation for Emergent Electronic Marketplace', In *CD Proceedings of 16th Bled Electronic Commerce Conference*, 9–11 June, Bled, Slovenia.
- Guo, J. and Sun, C. (2003b) 'Concept Exchange: Constructing Interoperable Electronic Product Catalogues in an Emergent Environment', In *CEC'03: Proceedings of IEEE International Conference on E-Commerce*, IEEE Computer Society, 165–72.
- Guo, J. and Sun, C. (2003c) 'Measurement Models for Survivability and Competitiveness of Very Large e-marketplace', in P. M. A. Sloot, D. Abramson, A.V. Bogdanov, J. J. Dongarra, A. Y. Zomaya and Y. E. Gorbachev (eds), *Proceedings of Computational Science — ICCS 2003*, LNCS 2658, Berlin Heidelberg: Springer-Verlag, 802–11.

- Guo, J. and Sun, C. (2003d) 'Context Representation of Product Data', *ACM SIGEcom Exchanges* 4(1): 20–8.
- Guo, J. and Sun, C. (2003e) 'Context Representation, Transformation and Comparison for Ad Hoc Product Data Exchange', in *ACM DocEng'03: Proceedings of the 2003 ACM Symposium on Document Engineering*, Grenoble, France, 20–22 November.
- Handschuh, S., Schmid, B. F. and Stanoevska-Slabeva, K. (1997) 'The Concept of a Mediating Electronic Product Catalog', *Electronic Markets* 7(3): 32–5.
- Heap, S. and Varoufakis, Y. (1995) *Game Theory: A Critical Introduction*, London and New York: Routledge.
- Heckscher, E. F. (1991) [1919] 'The Effect of Foreign Trade on the Distribution of Income,' in H. Flam and M. J. Flanders (eds), *Heckscher-Ohlin Trade Theory*, Cambridge, MA: MIT Press, 43–69.
- Keller, A. M. (1996) 'Multivendor Catalogues: Smart Catalogues and Virtual Catalogues', *EDI Forum: Journal of Electronic Commerce* 9(3): 87–93.
- Lloyd, B. (1996) 'The Outlook for Globalization', *Leadership and Organization Development Journal* 17(5): 18–23.
- Malone, T. W., Yates, J. and Benjamin, R. I. (1987) 'Electronic Markets and Electronic Hierarchies', *Communications of the ACM* 30(6): 484–97.
- Medjahed, B., Benatallah, B., Bouguettaya, A., Ngu, A. and Elmagarmid, A. (2003) 'Business-to-business Interactions: Issues and Enabling Technologies', *The VLDB Journal* 12: 59–85.
- Mowshowitz, A. (1997) 'Virtual Organization', *Communications of the ACM* 40(9): 30–7.
- Ohlin, B. (1967) *Interregional and International Trade*, Cambridge, MA: Harvard University Press.
- Omelayenko, B. and Fensel, D. (2001) 'A Two-layered Integration Approach for Product Information in B2B e-commerce', In *EC WEB-2001: Proceedings of the Second International Conference on Electronic Commerce and Web Technologies*, 4–6 September, Munich, Germany.
- Omelayenko, B., Fensel, D. and Bussler, C. (2002) 'Mapping Technology for Enterprise Integration', *Proceedings of the Fifteenth International FLAIRS Conference*, Pensacola, FL, USA, 419–24.
- Patel-Schneider, P. and Fensel, D. (2002) 'Layering the Semantic Web: Problems and Directions', in I. Horrocks and J. Hendler (eds), *The Semantic Web-ISWC 2002, LNCS 2342*, Berlin, Heidelberg: Springer-Verlag, 16–29.
- Phillips, C. and Meeker, M. (chief authors) (2000) 'Collaborative Commerce, The B2B Internet Report', April, Morgan Stanley Dean Witter.
- Reynolds, D. (1993) *Crackerjack Positioning: Niche Marketing Strategy for the Entrepreneur*, Tulsa, Oklahoma: Atwood Publishing.
- Ricardo, D. (1912) *The Principles of Political Economy and Taxation*, introduction by Michael P. Fogarty, London: Dent & Dutton.
- Robinson, M. and Bannon, L. (1991) 'Questioning Representations', in L. Bannon, M. Robinson and K. Schmidt (eds), *Proceedings of the Second European Conference on CSCW*, Dordrecht: Kluwer, 219–33.
- Sawhney, M. (2000) 'Go Global', *Business 2.0*, May Issue, <http://www.business2.com>.
- Schlueter-Langdon, C. and Shaw, M. (2002) 'Emergent Patterns of Integration in Electronic Channel Systems', *Communications of the ACM*, 45(12): 50–5.
- Schmidt, K. and Bannon, L. (1992) 'Taking CSCW Seriously: Supporting Articulation Work?', *Computer Supported Cooperation Work* 1(1): 7–40.
- Schmidt, K. and Simmon, C. (1996) 'Coordination Mechanisms: Towards a Conceptual Foundation of CSCW Systems Design', *Computer Supported Cooperative Work: The Journal of Collaborative Computing* 5: 155–200.
- Segev, A., Wan, D. and Beam, C. (1995) 'Electronic Catalogs: A Technology Overview and Survey Results', *ACM CIKM'95*, Baltimore, MD, USA.
- Smith, A. (1976) [1776] *An Inquiry into the Nature and Causes of the Wealth of Nations*, ed. R. H. Campbell, A. S. Skinner and W. B. Todd, Oxford: Oxford University Press.
- Stanoevska-Slabeva, K. and Schmid, B. (2000) 'Internet Electronic Product Catalogs: An Approach beyond Simple Keywords and Multimedia', *Computer Networks* 32: 701–15.
- United Nations (1987) *EDI for Administration, Commerce, and Transport (EDIFACT)*, online at: <http://www.unece.org/trade/untdid/welcome.htm>, accessed 15 April 2003.
- Weigand, H., Schoop, M., Moor, A. and Dignum, F. (2003) 'B2B Negotiation Support: The Need for a Communication Perspective', *Group Decision and Negotiation* 12(1): 3–29.
- Williams, T. (1993) 'The Purdue Enterprise Reference Architecture', in *Proceedings of the Workshop on Design of Information Infrastructure Systems for Manufacturing*, Tokyo, Japan, Amsterdam: Elsevier, 43–64.
- Williamson, O. (1975) *Markets and Hierarchies: Analysis and Antitrust Implications: A Study in the Economics of Internal Organization*, New York: The Free Press and London: Macmillan.