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B2B E-COMMERCE REVISITED: LEADING PERSPECTIVES ON THE KEY ISSUES AND RESEARCH DIRECTIONS

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ABSTRACT

The application of Internet technologies for the conduct of interfirm business transactions has given rise to a boom in business-to-business (**B2B**) electronic commerce. Yet, although there are many success stories that have been reported over the past several years, the progress of B2B e-commerce has been hindered by unanticipated technical, organizational, economic and legal challenges that diminish value. In this article, we report on a series of interviews with leading academic researchers and industry senior managers who are in a unique position to make sense of key issues and offer useful insights. The respondents provide their views on the efficacy of different business models in B2B e-commerce, the problems associated with B2B technology platform adoption and implementation, new ways of thinking about interorganizational information sharing and e-procurement business process design, investment decisionmaking and financial returns for e-business infrastructure, international and regional issues, and research directions.

KEYWORDS: B2B e-commerce, electronic markets, exchanges, information sharing, infrastructure, international issues, knowledge management, procurement, return on investment, supply chain management.

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INTRODUCTION

The application of Internet technologies for the conduct of interfirm business transactions has given rise to a boom in business-to-business (**B2B**) electronic commerce. Electronic procurement and electronic catalog management systems have been widely adopted to move corporate purchasing and selling online. In addition, a variety of electronic markets have been set up to facilitate interfirm transactions and broaden market access for buyers and suppliers. Yet, although there are many success stories about the application of Internet technologies in this area that have been reported over the past several years, overall, the progress of B2B e-commerce has been hindered by many unanticipated technical, organizational, economic and legal challenges that diminish value [2]. And, even given the number of interesting and new theoretical interpretations of the developments in the marketplace and the transformation of market structure and industrial organization [9], the reality is that we are still at a very early stage in our understanding of B2B e-commerce phenomena.

In this article, we take a number of steps towards understanding the extent of the alignment between academic interpretations and the reality of the ever-changing industry marketplace. The first half of this article focuses on B2B e-commerce business models, the issues that relate to technology adoption in this context, and the business value and organizational benefits that arise in this context. The latter part focuses on managerial approaches to making B2B e-commerce pay off, considers the regional and global dimensions, and concludes with some specific suggestions for future research that we and our interviewees offer.

To explore these key issues and develop a sense for the appropriate research directions for the future, we showcase the thinking of a number of leaders in the area of B2B e-commerce and supply chain management technology solutions through a series of interview extracts. These interviews also were conducted in the time frame of the reviews for other articles in this special issue of *Electronic Markets*, with the idea in mind that they would assist in grounding our evaluation of the research articles that were submitted for review.

Interview Participants. From August to November 2001, we interviewed more than one dozen people, including university-based senior faculty, noted authors, research center directors and e-commerce journal editors, and visionary senior managers whose firms deal with the leading-edge issues in B2B e-commerce on a daily basis. We chose the participants based on the extent of their expertise in a variety of electronic commerce contexts (e.g., theory-building experience in research, knowledge of specific industries, international coverage of leading e-commerce industries in Asia, Europe and North America, leadership roles in B2B e-commerce firms, and experience with setting the research agendas of leading university research centers. On the industry side, the participants were as follows:

- Mr. Andrew Loder, Cargill eVentures, Cargill, Inc., USA

- Mr. Kevin Lynch, president and CEO, Nistevo, USA
- Mr. Joel Ronning, CEO, Digital River Inc., USA

On the university side, we interviewed these people:

- Prof. Eric Clemons, Wharton School, University of Pennsylvania, USA, and *Electronic Markets* editorial board member
- Prof. Omar El Sawy, University of Southern California, USA, and author of *Redesigning Enterprise Processes for e-Business*, McGraw-Hill, 2001 [3]
- Prof. Ray Hackney, Director, BIT Research Center, Manchester Metropolitan University, UK, and author of *Business Information Technology Management: Alternative and Adaptive Futures*, Palgrave, 2000, with Dennis Dunn
- Prof. Jean Kinsey, Director of the Sloan Foundation's Food Industry Center, University of Minnesota, USA
- Prof. Dr. Stefan Klein, Chair in Interorganizational Systems and Director, Department of IS, University of Muenster, Germany, *European Journal of Information Systems* associate editor, and *International Journal of Electronic Commerce* and *Electronic Markets* editorial board member
- Prof. M. Lynne Markus, Chair in Electronic Business, City University of Hong Kong, China, and author of *Data Warehouses: More Than Just Mining*, Financial Executives Research Foundation, 2000, with Barbara Bashein
- Prof. Barrie R. Nault, David B. Robson Professor of Management (MIS), University of Calgary, Canada
- Prof. Michael Shaw, Leonard C. Hoeft Distinguished Professor in Information Technology Management, University of Illinois, Champaign-Urbana, USA
- Prof. Peter Weill, Senior Research Scientist and Director, Center for Research on Information Systems, Massachusetts Institute of Technology, USA, Professorial Fellow, University of Melbourne, Australia and author of *Place to Space: Migrating to E-Business Models*, Harvard Business School Press, 2001, with Michael Vitale [10]
- Prof. J. Christopher Westland, Hong Kong University of Science and Technology, China, author of *Global Electronic Commerce*, MIT Press, 1999, with Ted Clark, [13] and *Valuing Technology: The New Science of Wealth in the Knowledge Economy*, John Wiley & Sons, 2001 [12].

Interview Process. Each participant was given the opportunity to comment on three to five questions during a 15 to 20 minute telephone or face-to-face interview session. In addition, one or two respondents either provided us with written replies or suggested that we examine some of their recent writings for their current perspectives, as a basis to make the brief interviews more focused and meaningful. The interview questions generally dealt with industry issues and directions for B2B e-commerce research, and

we encouraged the interviewees to respond with their business experience and research findings to date in mind.

Our interviews reflect comments on the range of B2B e-commerce solutions that can be applied in various contexts, but they also emphasize the different roles that participating firms can play. For example, B2B electronic exchanges that emphasize liquidity are suitable for commodity markets, while channel coordination is more important where there are limited numbers of buyers and sellers. A related issue is the recognition of the role and impacts of interfirm collaboration, business process management, and supply chain management in the implementation of B2B e-commerce solutions. In addition, although our interviewees identified various value propositions that B2B e-commerce solutions can offer to participants, they also mentioned the underlying motivations for firms to adopt these innovations and the associated adoption hurdles. The industry and academic leaders propose a series of strategies that can help managers to discern appropriate business opportunities and maximize value from investments in B2B e-commerce solutions. Our interviews also uncover some regional characteristics in the deployment and adoption of B2B e-commerce solutions. Finally, our interviews identify a number of possible development trends and potential issues for B2B e-commerce research.

THE ROLE OF B2B ELECTRONIC COMMERCE SOLUTIONS

With the recent business and technological developments occurring at such a rapid pace, our understanding of the nature of B2B electronic commerce and electronic markets will likely evolve from a number of different perspectives. Among them we first consider the new kinds of business models that have been developed, and the manner in which the participating firms view these innovations. Some of the leading questions of our time are as follows: What will be the successful business models for B2B e-commerce? What are the most successful strategies for B2B e-markets and the firms that adopt them? How can industry operating B2B e-marketplaces be leveraged in supply chain management? What theoretical perspectives will help us to understand what is going on?

Ray Hackney. A number of business models have been described within the e-commerce marketing literature, but there have been a few new that are specific to B2B e-commerce. The first is what we may call the *virtual marketplace*, a place for products used in single enterprise. The next business model, the *virtual alliance*, is slightly more complex. By sharing business resources, this model permits the participating firms to operate around a common systems interface, which enables cross-referencing of key data related to electronic procurement. Finally, the *virtual community* business model expands upon the virtual alliance, by permitting multilateral data sharing and participation.

Eric Clemons. B2B e-commerce has existed for a long time already—since the first implementation of interorganizational systems such as electronic data interchange systems. In prior research in IOS, the

move-to-the-middle theory tells us that for many products, there is a need for coordination [1]. This theory also helps us understand various issues in today's B2B e-commerce research. For example, for a pure commodity product with a nearly infinite number of buyers and sellers, an exchange is fine. But, for a product with a limited number of buyers, a limited number of sellers and highly variable demands, you would almost certainly want explicit coordination. In this context, it is crucial to understand the role of B2B e-commerce in terms of *channel coordination*, which coordinates the production schedule of suppliers with the production schedule of one's own factory. Some B2B exchanges emphasize the need for liquidity. But liquidity alone can not ensure success in the arena of B2B e-commerce because interfirm coordination lies at the heart of interorganizational interactions. One of the reasons that many B2B exchanges fail in today's markets is that they do not offer enough support for channel coordination between the buyers and suppliers participating in B2B e-marketplaces.

Peter Weill. Shared infrastructure models and intermediaries are examples of B2B exchanges where potentially high levels of value can be created [10]. One of the big issues with the shared infrastructure model is how you manage information, what information fields or information elements are shared across the competitors, and what information fields are private [11]. One of the reasons these shared infrastructure models are taking so long to implement is because firms are still in the midst of trying to understand how to manage information. A related issue is that sharing infrastructures tends to reduce or remove one of the strategic dimensions that companies can leverage.

For example, with Covisint (www.covisint.com), a global and independent e-business exchange for the automotive industry that was initially founded by a group of car manufacturers (General Motors, Daimler Chrysler, Ford, Nissan and Renault, later to be joined by Peugeot-Citroen), we see that the industry has begun to cooperate by building a shared infrastructure and technology platform which they use to access suppliers and manage their supply chains. In this case, those companies are saying that they will no longer compete on the basis of the electronic connection to the supplier. Instead, they are now aiming to have an equitable and fair industry infrastructure that is used by all manufacturers and accesses all of their suppliers. This is a major change in strategic position that requires a lot of trust and effort before it can be made to work. There is a lot of opportunity too—both on the demand side and the supply side of the value chain—but these are non-trivial agreements to negotiate and are very segment-specific as well. (A number of our interviewees referred to Covisint, which is one of the major examples of a successful B2B e-commerce model. For an overview of Covisint's business model, see Figure 1.)

 INSERT FIGURE 1 ABOUT HERE

Kevin Lynch. Another important aspect of the business models of B2B e-commerce involves interfirm collaboration [6]. There are two types of collaboration in B2B e-commerce. The *first* type is *vertical collaboration*, in which firms are effectively collaborating backwards and forwards through the supply chain with either or both of their suppliers or customers. Typically the *return on investment (ROI)* from vertical collaboration has results from rapid communication. This involves better information flow across the supply chain and less latency in communicating changes through the supply chain. Vertical collaboration via B2B solutions enables manufacturers to obtain demand information faster and with greater accuracy.

The *second* type of collaboration is *horizontal collaboration* where companies are neither the suppliers nor the customers of each other; instead, they are mainly competitors, but they are working on some basic problem in the economy. In logistics, a good example of the problem that firms are sharing in the industry is *asset repositioning*. Asset repositioning causes a hidden cost in the economy that no one party controls directly, but all parties involved bear the cost. In the case of truck delivery, the time and distance that a truck driver has to take to get to the next pick-up from the last delivery destination is an asset repositioning cost. So, through horizontal collaboration, we create the possibility for bringing together both the demand and the supply, including the carriers and the shippers. This way, we can optimize schedules and squeeze more inefficiency out of the process. The key thing is to reveal this hidden cost—the asset repositioning cost—and then use a network approach to attack that cost, to measure and reduce it, and to share the savings across the network.

ROADBLOCKS TO B2B E-COMMERCE TECHNOLOGY ADOPTION

Although B2B e-commerce solutions are claimed to create value for firms, the record shows that firms have been slow in adopting these solutions. We next asked the interviewees to consider the barriers that hinder the adoption of B2B e-commerce approaches, as a way of identifying some of the leading topics for research. They also offered thoughts on what strategies are effective for B2B market-makers and systems providers to use to encourage more rapid adoption, and remind us to consider such issues as coordination, network externalities and the role of critical mass relative to the successful implementation of e-business initiatives.

Stefan Klein. Many researchers have sought explanations for the overall slow pace of adoption in this area. *First*, an explanation for the accelerated adoption of B2B e-commerce approaches is the progress of technology. So it is now easier, more convenient, and the price to get involved in doing it has come down. *Second*, and related to the first point I made, many especially small and medium enterprises have started to use Internet technology as a means for communication and email. Hence, they can take advantage of the new technologies for more advanced applications without bearing the full burden of the

cost. As a result, B2B e-commerce can now be built upon this infrastructure. Where previous investments in interorganizational systems (**IOSS**) have been made—for example, in technical standardization—the transition to B2B e-commerce will become easier [5].

Eric Clemons. Firms are moving to B2B e-commerce solutions because the coordination software is getting better. When two firms finally get their SAP implementations to work, and they are doing ERP system links, then they are able to do supply chain optimization.

Andrew Loder. Barriers that have hindered adoption of B2B e-commerce are wide-ranging and complex, including industry-based, organizational and behavioral hurdles. Early B2B e-commerce solutions were simply misaligned with industry structures. They ignored existing industry structures, even proposing to disintermediate key industry players, but failing to recognize the role they play in an industry. The ones that did get it right often struggled with a “chicken-and-egg” problem. For a solution to be useful to users, it required significant usage. This is especially true in “pure marketplace” models that attempted to bring buyers and sellers together.

E-commerce solutions with an aligned industry and business model face other barriers around organizational and behavioral decisionmaking. Many solutions are developed by nascent startups that market into established enterprises. While enterprises are willing to experiment with new solutions, they are reluctant to commit to products or services from startups that might be out of business six months from now. They can't afford to take that corporate risk. While this is true for any new products, the difference is that many B2B e-commerce solutions address strategic and core business transactions, so the risk is more significant. Finally, B2B e-commerce took information technology (**IT**) out of the back office and put it into the front office—that is, B2B e-commerce created solutions that touch customers, sales people and sales support. It's not about transmitting EDI messages between computers. It's now about new tools for researching, decisionmaking, ordering, selling, and communicating that the front office is using to change the way it does business. These require behavioral changes that don't happen overnight.

Michael Shaw. The adoption of B2B e-commerce involves important issues in technology adoption. It is more complicated than what happens when firms take a traditional approach to adoption. Now, it includes not only adoption of IT within an enterprise, but also firms have to think about the adoption of IT solutions that involve multiple enterprises. This is because B2B e-commerce involves market participation. On the other hand, B2B e-commerce also offers a way to solve the problem because it facilitates the standardization of technology in supply chain management. So, although you have the technology adoption hurdle, if they are developed well by solution vendors and the firms that adopt them, B2B e-commerce models can actually provide potential solutions that the marketplace has not seen before.

Barrie Nault. Overcoming the problems of adoption of B2B e-commerce technology solutions is related to the effects of *network externalities* and *technology standards*. On the one hand, the implementation of standards will aid the adoption of networks. On the other hand, standardization will restrict the activities that are possible when firms use network technologies. I would especially point out the importance of the *complementarities* involved with multiple parties' investments in B2B e-commerce. This is another reason for why we are seeing relatively delayed B2B e-commerce adoption in the United States and Canada. In implementing B2B solutions, investments from market-makers, buyers and suppliers are complementary in the sense that the investment from one party in developing the infrastructure will give incentives to other parties to also make investments in the infrastructure.

There are two questions that arise here. *First*, what are the optimal investment levels by electronic markets and participating firms, respectively? How will senior managers know how much to invest? When market-makers build the infrastructure of B2B electronic markets, they may choose to make investments to customize their systems for individual participants, as a subsidy to encourage adoption. *Second*, how are firms' investment decisions likely to be affected by other participating firms' investments? For example, when more suppliers have set up linkages with an electronic market, buyers will have a greater incentive to make complementary investments in an electronic linkage with the market. So as a result, generally, individual firms' investments will be affected by those of their competitors and partners. The question is how individual firms decide upon optimal investment levels, given their competitors' and partners' investments [8].

In summary, it is difficult to get to a market equilibrium of investment levels, and this will result in some hesitation on the part of firms in making investments in B2B electronic markets.

Peter Weill. Another of the key barriers for implementation of B2B systems solutions is *trust*. The system will need to be fair and secure, and not put any of its participants at a disadvantage with respect to any other participant. The systems also need to treat partners equally. For example, since the time that the automotive manufacturers started Covisint, they have invited other new players and new manufacturers to participate in building a shared electronic procurement infrastructure for the industry. The new participants may be placed in a less than equal position relative to the founders of Covisint. So, one of the big issues that arises is whether all of the participating companies are truly able to have equal access to the marketplace. That's a hard thing to ensure. It often requires a third-party managerial structure or even an audit firm to ensure that. So, again I would stress that trust is one big barrier.

The second big barrier is *market preparedness*—whether the marketplace is actually ready for B2B systems solution. In the last two or three years many observers have over-estimated the readiness of the marketplace for B2B e-business services, particularly the procurement exchanges. The reason for this has to do with an overall lack of understanding on the part of market observers about market segmentation.

There are segments of the market that are ready to do business electronically—even strictly through a B2B exchange—but they are not universal. So I would argue that both business people and academic researchers need to spend more time and effort in understanding the segments.

The third barrier for these sorts of models and exchanges to be successful is that they should have *single points-of-contact* for customers from multi-business unit firms. If a large multi-business unit firm wants to offer a B2B system for its corporate customers, then there ought to be the recognition that the greatest level of benefit would flow from the customers being able to access all of the business units within the firm. But achieving that requires a change in the way in which many companies market and manage their customers, and the way in which the customer relationship management function works. It also usually requires shared firm-wide IT infrastructure in a way that many firms have not had before. Instead, firms have had infrastructures that were targeted for a particular business unit that was selling to a particular kind of corporate customer. Now, if a firm offers a single point of contact, this will require a dramatically different firm-wide infrastructure. That's a big change for companies. Still, they are making progress towards building firm-wide infrastructures and shared services functions to provide this integrated capability. But it takes time, it takes dollars to invest and it also calls for a change in internal organizational behavior.

Jean Kinsey. In most industries, such as the one I follow most closely—the food industry—we see a highly fragmented B2B procurement market. The problem with smaller companies adopting B2B e-commerce in the fashion that most observers suggest is that they do not have the capital to invest. And even if they did, they probably are not able to carry a large enough volume of transactions in their supply chain to benefit that much from using the technology. Another thing that has been a significant roadblock for a long time is that the computer systems do not talk to each other easily. For example, a set of grocery stores in upper Michigan set up a “nice” computer system that they can use to transmit data and receive data. But that computer system is not able to talk to the computer system at Proctor & Gamble. The systems are built to totally different specifications.

The other problem is that retailers lack enough trust in their suppliers in sharing supply chain and procurement data. Retailers are afraid that a big supplier—say a Proctor & Gamble or a General Mills—will either share that data with a competitor or will somehow use that data to achieve competitive advantage in some way. So they are reluctant to share even that standard data, at least in an “unsanitized” form. By keeping their data private, they hope to realize a competitive advantage over suppliers; meanwhile they compromise efficiencies that could be gained from the sharing of data with suppliers in the distribution chain. Therefore, I argue that the key success factors in B2B e-commerce are *trust* and *compatible computer systems*.

BUSINESS PROCESS DESIGN AND SUPPLY CHAIN MANAGEMENT

Most observers note the extent to which business processes have been changed by B2B e-commerce applications. Others suggest that it is not only the business processes that are changed, but the competitive positions of participating organizations are subject to change as well. In this context, we asked the respondents to consider the issues that arise when firms plan the deployment of B2B solutions—for example, changes in critical business processes and firm risk management—and how implementation success is likely to affect firm performance.

Stefan Klein. B2B electronic commerce solutions are an expansion of IOSs based on new technology. B2B is very much related to interorganizational business process redesign and network redesign. In fact, in my view, it has become much more a matter of process integration than anything else. Today, as a result, what we see are different aspects of the overall process from procurement to sales and distribution which in the past have been dealt with separately [5]. These processes are coming together into coordinated activities now.

Omar El Sawy. First of all, I think that process management becomes a more pressing issue with the increase in B2B e-commerce, where interfirm collaboration becomes important and processes interact in near-real time. *Process management* involves making sure that enterprises have business processes that are well designed, that the processes are effectively integrated with information technology infrastructure, and that they are also well managed. Business process redesign emerged in the early 1990s, but managerial expectations were set too high and were misplaced amidst cost-cutting and downsizing. There was broad-based disappointment and the impetus for further process reengineering initiatives cooled down over the ensuing years. Today we are seeing a second wave of business process redesign occurring in industry with the growth of e-commerce and e-business. This new wave involves rethinking, redesigning, integrating, and managing business processes at both the enterprise and supply chain level to take advantage of Internet connectivity and new ways of creating value.

In this context, there are a number of issues that will be very interesting to tackle. One is: How do you design *knowledge-intensive business processes, and conversely, how do you harness knowledge management as a strategy for business process redesign?* There is a lot of interplay between knowledge management and business process redesign, and this connection has yet to be fully leveraged. We really do not yet fully understand how to best capture this relationship and increase the knowledge creating capacity of day-to-day operational processes. So it is no surprise that this is especially true in the B2B e-commerce context. In addition, there are questions that arise related to what types of information you gather and share to improve knowledge creation and sharing, and whether the information is structurally different across different organizations in B2B e-commerce. So these knowledge and process-related

concerns become one important aspect of redesign that have the power to make or break the value they bring to an enterprise.

There are other aspects of redesign that arise in e-business when processes become as complex as they are in typical day-to-day supply chain processes, such as procurement or order management. One key issue is how we design business processes to deal with exceptions when the process is being executed? One intriguing school of thought suggests that the exception process itself should be designed as a separate process. Thus, an e-business process would be designed as two processes: a *simple process* that maps the typical way the process works under normal conditions, and a *separate exception process* that captures both identified and non-identified exceptions that occur infrequently. The logic of the separation is that the two processes are structurally and inherently different. The exception process is much more knowledge-intensive, involves heavier information exchange, is generally much more costly, and needs to be redesigned very frequently as new exceptions occur. Does this approach result in more robust designs? What trade-off theories can be developed here?

Then there is the process integration aspect in B2B contexts. That is a really difficult area for practice and it is also under-researched by IS academics. It brings to the forefront a number of research issues. One is interoperability standards at the process level and *process modularity*. How do we design modular processes that “plug-and-play” with each other across enterprises and supply chains? How do we design standards for interorganizational interface processes such that automated applications can effectively communicate at the business level and the technology infrastructure level? What types of infrastructures will facilitate information and knowledge exchange and capture across disparate enterprises with different back office systems? The RosettaNet consortium (www.rosettanet.org) in the IT industry was one industry’s effort to deal with process integration issues across multiple partners in a very dynamic industry. RosettaNet had an accompanying research effort which I and two junior colleagues were involved with that tried to answer some of those questions, and how enterprises could be made organizationally ready for such B2B e-business activities.

Another related issue is around the sequence of initiating *IOS integration* in the B2B e-commerce context: Should enterprises focus on internal integration first and get their ERP and back office in good shape? Or should business partners in a supply chain work towards achieving external integration with other first? While there are arguments that support either side, the current software market is mainly geared to designing software and structuring licenses mostly for individual companies. However, there appears to be an emerging trend to design software that is targeted for groups of enterprises together, whether in functionality or in terms of licensing arrangement. These are just some of the interesting issues in process integration, and I think we will be dealing with the process of integration for many years to come.

The third part of process is *process management*. That aspect brings up a number of key areas that require attention in both practice and research. *First*, there is much work to be done on understanding how to effectively manage automated workflows that cross enterprise boundaries. We need to better understand how to more closely achieve real-time process monitoring as a process is being executed, and find ways of correcting errors and performance problems in faster and more efficient ways. In large-scale B2B processes it is desirable to get alerts and redirect processes, to ensure that the operational performance is acceptable. *Second*, there are issues of collaboration. That is where a lot of the value can be created. Collaborative integration entails a tight collaborative relationship among all partners, deep visibility across all tiers of the supply chain, and near-real-time information exchange and knowledge sharing around supply chain processes. Visibility is becoming an important research issue in this context. Companies that act as supply chain leaders or orchestrators want to get early warning of changes in the status of their partner's processes. They want to see three or four levels deep into the supply chain to identify what the status of the suppliers is, so that if there is any change in demand or supply, they can quickly adjust to it. They also want to be able to capture customer information in this way so they can capture customer needs and anticipate them, and then create value by customizing around that. Clearly, the value comes from being able to collaborate, and being able to take advantage of the information technology platform and different forms of information exchange. This is the way to generate new products and services, as you find out more about the market and the customers you serve. Collaborative integration is one of the key elements of process management in B2B e-business environments.

Michael Shaw. B2B e-commerce makes management more productive because it provides additional channels for supply chain departments to work with each other. Those interactions will provide opportunities to coordinate activities across the supply chain. The impact of B2B e-commerce should be seen from the viewpoint of supply chain integration.

Andrew Loder. I agree that one of the biggest issues that you have with most supply chains is *visibility* across the entire supply chain. So, ideally the Internet and IT will allow you to increase that visibility, and allow the decisionmakers to get real time information to see where the bottlenecks are in their business processes. Obviously the technology does not change anything by itself, but it allows the key people along the supply chain to make better-informed decisions.

Chris Westland. In spite of some of the benefits that firms expect, one big risk in B2B e-commerce is *compatibility risk*. The crucial relationship in B2B markets is the compatibility among the pieces of the network. Compatibility assures that various orders in the market can be mixed and matched for free to produce demanded and, thus, valuable services. This is why standards are important. Compatibility risk can be managed by establishing responsible, incentive-driven and well-informed standard setting bodies, for example ANSI and the IEEE. The second big source of risk is *transaction completion risk*. This is

the risk that a buyer may not pay for, or a seller may not deliver the product at the price and terms negotiated. In the extreme, it is also possible that one of the parties to the transaction may renege entirely. The solution to this risk is licensing and bonding all participants in a market, forcing them to maintain minimum capital balances, and to establish a broker community through which buyers and sellers can trade. A broker can act to balance the risk concerns of the parties in a trade transaction.

VALUE AND BENEFITS

One of the most important aspects of B2B e-commerce is the considerations that firms give to investment decisionmaking about the related Internet technologies, and the manner in which they understand business value and ROI [4]. The key issues involve how firms can leverage B2B e-commerce solutions, such as open e-procurement systems or B2B electronic markets, to improve firm performance and generate business value. Organizations adopt B2B electronic markets and e-procurement systems as firm infrastructure to improve interfirm transactions. However, the investment levels that are required are very large (compared to business-to-consumer Web sites, for example), and the benefits are uncertain. We asked the interviewees to comment on the investment incentives and the nature of decision-making in deploying B2B e-commerce solutions. In particular, what are the key things that market operators and industry participants need to get “right” for industry-focused B2B e-marketplaces to be successfully implemented and to create value for their participants?

Lynne Markus. Different B2B e-commerce applications will have different benefits for firms that invest in them. For electronic markets, for example, there are two parts of the benefits: the business part and the technology part. On the business side, B2B e-markets enable firms to find new suppliers, and they tend to drive down product prices. On the technology side, e-markets provide external IT services, and valuable IT skills and expertise that will drive the adoption of B2B e-commerce. I personally think that the latter weigh more than the former. In fact, based on the previous research and industry experiences, we know that firms do not want to drive their suppliers out of business by forcing them to lower their prices too much.

Michael Shaw. *First*, B2B e-commerce systems provide economic value. *Second*, one can also argue that they provide value to process re-engineering. And *third*, they provide value by enabling senior managers to think about ways of doing things in a completely different way on the organizational level. As a result, the key issue here is to provide a methodology for measuring business value.

Jean Kinsey. Firms believe they can increase ROI on B2B e-commerce investments by taking costs out of the distribution channel. They can increase the efficiency of distribution channels by providing suppliers with sales information from the stores. Ideally, a good B2B e-commerce system will transmit data on items sold, which are collected by the scanning system, almost directly to the supplier. The

supplier then can determine the schedule by which the firm should be replenishing or replacing its products on the retail shelf. As a result, there is an attempt to build a just-in-time delivery system. Through the arrangement of just-in-time delivery, both retailers and suppliers are able to reduce inventory costs because the computer systems linking the two sides enable timely information exchange and reduce the need for high inventory levels.

Andrew Loder. E-commerce solutions have to present tangible value with a concrete ROI, either by increasing the revenue or decreasing the costs for a user. Increasingly participants are looking at the full, hard and soft costs of implementing solutions, including costs associated with licenses and fees, integration, implementation and training. The higher the cost of a solution, the more concrete the ROI has to be. And in today's market environment, the payback horizon on that investment has shortened considerably, in many cases to under a year.

Kevin Lynch. Collaborative B2B networks have significant value for their participants. One is better predictability and reliability in providing services. In the case of logistics, think about a truck driver who is able to run on scheduled routes at a relatively regular basis because the collaboration among carriers and shippers makes his running schedule more regular. So he has a better idea of the traffic patterns on the route and is able to deliver the goods more efficiently. The shipper also benefits because now she is in a situation where the service reliability, from an on-time delivery standpoint, might go from 96% to 99%. For carriers, in addition to the improved service quality, the increased regularity in scheduling tours also helps relieve driver retention problems. Nistevo's (www.nistevo.com) collaborative logistics network enhances the forward or demand visibility for the carriers by letting them receive timely information from shippers. This helps the carriers to better position their assets. This way, we are actually increasing the carrier's margin, but at the same time reducing the overall cost of transportation because we have taken out the inefficiency and are splitting the benefits between the shipper and the carrier. This is a pure gain-sharing model, and you need to have something like this in place to make B2B e-commerce work well on behalf of all the participants.

Joel Ronning. Asking "How can we maximize ROI for investments in e-business infrastructures?" is a very timely question. That is because virtually every client that my company, Digital River, talks with, does an ROI evaluation. There are several components to ROI in the B2B e-commerce context that we serve. One is the *dollar level of investment* that is made by the company, and the others, on the back-end, are the level of *margin that develops* and the *savings enabled* by the project.

The first thing that we ask a client like Fujitsu, Siemens, Symantec, 3M, Polaris, and Nabisco to do—is to define what their goals are for the initiative. What are the revenues or savings that managers expect the project to deliver? Our strategy is to set up an achievable goal on the back-end in terms of revenue or cost savings, and then, from that we help the client decide on the appropriate scope of the project on the

front-end. Matching the expenses on the front-end to the output on the back-end: that's the key to the ROI. You need to test the goals you set against other investors and companies that have experience with a technology or a business process. Once you have tested that, then you do what you can to make sure that you define the scope of the initial project so that it does not overwhelm the ultimate back-end value of the project.

MANAGERIAL STRATEGIES

Prior research and practice have shown that IT often has impacts on organizational structures, business processes, industrial structures and so on, many of which are unanticipated. This has been no different in the area of B2B e-commerce, and, as a result, firms are forced to explore new management strategies that they did not expect even two years ago. For example, one way that the industry operating B2B markets can reach critical mass is to get liquidity commitments from the founding companies and partners, so that they can assure a certain transaction volume to get the market jump-started. (Covisint again provides a good leading example.) Another example is found in the guest editors' recent research on the business models of B2B electronic markets. We note that, in addition to the core market functions that initially drove this area of technological innovation, there is now much greater emphasis that is placed upon consulting services for business process redesign, efforts to sponsor technical standards, help with interfirm coordination, and technological adaptability and systems integration [2]. Another important aspect, as we will shortly see from our interview respondents, is how the general industry structure is being re-oriented around private trading networks and public electronic markets. We begin with a consideration of the planning process for B2B e-commerce and what it takes to launch successful technological solutions in this arena, including B2B procurement exchanges.

Ray Hackney. The main issue related to strategic planning in B2B e-commerce is the formulation of a strategic approach for e-commerce adoption and e-commerce deployment: this strategy should be context-specific. As a result, B2B e-commerce deployment essentially needs to be focused towards specific objectives—the strategic mission—of the organization. The specific focus in strategic planning for B2B is the notion of innovation value and the financial return that the technology is providing in relation to the customer interface. This involves trying to identify the core value proposition. With B2B e-commerce technology investments, the focus of valuation should be to move away from technological sophistication within B2B systems deployment, and more towards making certain that the objective of market segmentation and segment returns are achieved.

Eric Clemons. To launch an exchange, you need the law of large numbers working for you: you need lots of buyers, lots of sellers, and more or less statistically predictable demands. The first thing that the exchanges should do is to make sure that they are targeting a product or service, and a market to

which an exchange makes sense. For instance, the buying and selling of fresh fish demands an exchange rather than bilateral channel coordination agreements between buyers and sellers. You cannot produce fresh high quality deep sea fish like sashimi grade toro tuna to meet a buyer's schedule. You cannot harvest a large quantity of sashimi grade hamachi or uni in advance and save it until demand materializes. You will always need to match current supplies and current demands, using the pricing mechanisms of an exchange to perform price discovery and achieve allocative efficiency. For this reason we have always had local markets for fresh fish, in Tokyo, in New York, in San Francisco, and in any large city with a fishing fleet. Perhaps for those products for which the value of the fish justifies air shipment, linked global sashimi markets may some day emerge, but for these game fish bilateral contracts do not appear likely.

There probably will be an exchange for overstocked or out-of-date computers because you never know what they are going to be worth. So there are still opportunities for exchanges, but the market for fresh fish and the market for obsolete Pentium II machines are very small: much smaller, in fact, than the markets that Vertical Net (www.verticalnet.com) has for pulp and paper, or aerospace parts, for example. The second thing to remember is that it is extremely difficult to compete with an exchange that already exists. We already have significant evidence that says competing with a liquid exchange is extremely difficult, so that means you need to find a market for which there is not already a successful exchange. Only then, will there be much chance to create value in the marketplace.

The main function of exchanges is to enable price discovery and this is most efficient when there are a large number of buyers and sellers in the marketplace. However, for many business-to-business transactions, prices are transparent and so prices are not the key issue. Other issues, such as timely delivery, quality, and supplier reliability are the main concerns. In these cases, explicit channel coordination is more desirable than price discovery, and firms tend to enter into bilateral buying and selling rather than transacting with multiple parties. The fundamental issue here is to be able to tell when you will need exchanges and when you will need explicit channel coordination.

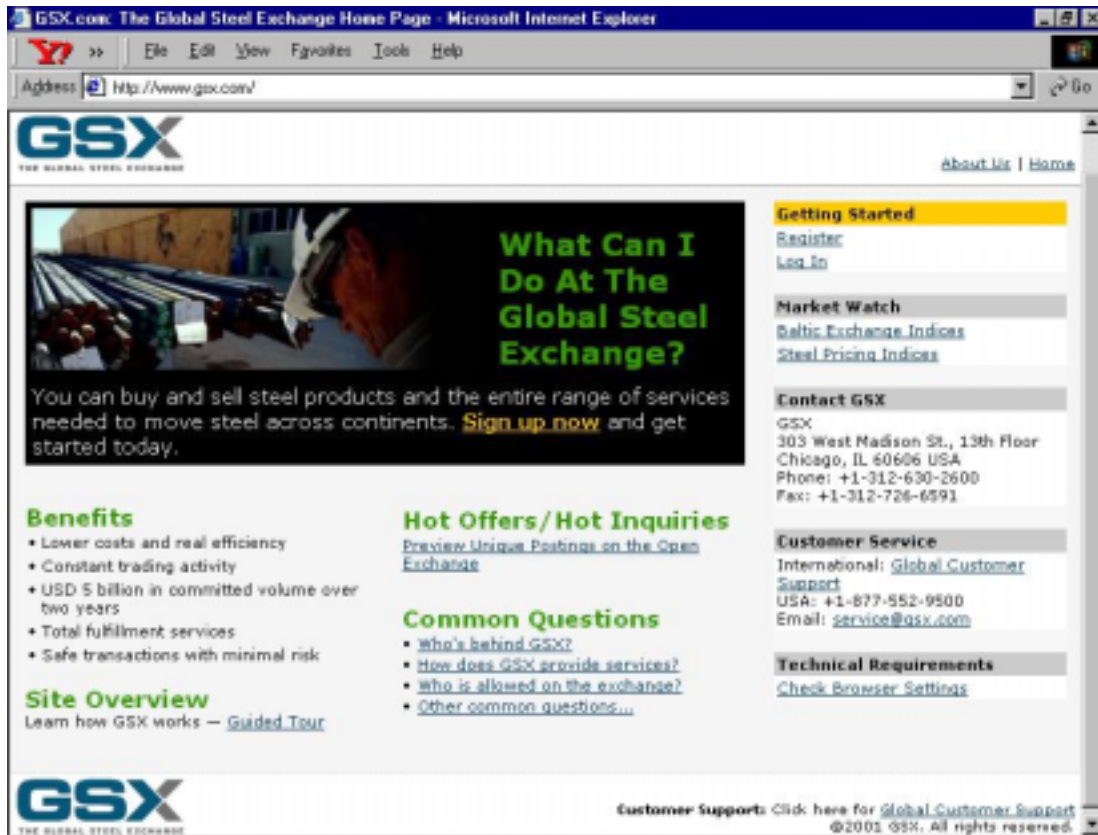
Chris Westland. *Market exchanges* work best when the items traded are *homogeneous*: all items have the same identical specification. They also function well when standard settlement and delivery terms apply, and credit risk and quality control are non-issues. When multiple parameters other than price need to be negotiated, or when each counterparty to a trade needs to assess the creditworthiness or the ability to fulfill a contract by another firm, then the anonymous exchange system becomes impractical and the ability to “auto-match” buyers and sellers breaks down. *Direct negotiations* then typically will take place, and the counterparties will regard the result as a commercial secret. It is also the case that the large consumers and distributors of products, such as steel and paper, will already have steady relationships with existing suppliers. These suppliers will be “pre-qualified” in some sense. So, therefore, if a buyer

wants to invite tenders from these familiar business partners, they can send out e-mails themselves, or set up their own tendering Web site (as have a number of the big auto firms), and invite bids from suppliers. They are unlikely to go to an exchange and pay someone else to do it.

Andrew Loder. There are many strategies for success, and not every approach is applicable. These are a few strategies we've seen succeed:

- ❑ **Break “the chicken and the egg.”** The example is Global Steel Exchange (www.gsx.com), which has a significant transaction volume, enabling it to survive the recent slump in e-commerce when many B2B electronic markets folded. (See Figure 2.)
- ❑ **Consider and address the full transaction.** Too often, solutions don't address the full activity, and the result is that the product or service is not useful in the absence of other components. For example, when Cargill ships grains from one port to another, managing the voyage after a vessel has been chartered is as important as the transaction to charter the vessel. An example is LevelSeas.com (www.levelseas.com), a complete voyage management solution that provides pre-transaction and post-transaction capabilities to participants.
- ❑ **As industry adoption and usage grows, pursue additional channels of revenue that uniquely leverage the information and the customer base.** For example, market analyses or correlated services from related partners can be uniquely offered to participants.
- ❑ **Drive adoption with a solid plan to get participants to implement.** You have to have a plan in place that is going to accelerate adoption. Investors need to obtain incentives to implement and then to keep using the market. A plan is needed to get people to use it.

Figure 2. GSX, the Global Steel Exchange: A B2B E-Market Survivor



Source: www.gsx.com, October 22, 2001.

Joel Ronning. To successfully implement e-business initiatives, absolutely “Number One” is appropriate goal-setting and expectation-setting. Most of the projects that fail end up that way because the goals are not clear, the outcome is uncertain and is not clearly communicated, and it is not sufficiently bought into by senior management. By the way, this process has to include identifying the proper mix of political and economical objectives. Then, there is “scope creep.” To make B2B e-commerce projects really come together you have to be very adamant about not letting the scope expand beyond the agreed upon parameters because that will destroy the project. That requires a tremendous amount of discipline, because everybody has an opinion on what the opportunity is and on ways of doing it. Keep in mind that because nobody has a lot of experience, everybody is an expert.

Kevin Lynch. Another important managerial consideration is the application contexts for *public trading networks* and *private trading networks*. The key here is that people will put *non-strategic intellectual property* in a public trading exchange in order to gain whatever value is created by that public exchange. For example, a manufacturer may want to normalize its packaging SKUs through a public exchange, since this is not strategic and the exchange has already done the standardization. The standardization has economical benefits to participants in the network. The manufacturer benefits from a

public domain source of standards, and that is something that it will participate in because its competitors are going to participate and enjoy increasing returns. If it does not join, it is actually at a disadvantage, and if it does join, the advantage for both is equalized.

In contrast, firms are going to take *strategic intellectual property*—be they business processes or strategic suppliers—to private exchanges. For instance, a manufacturer has figured out that a specialty chemical provider can give your product a strategic benefit over your competitors. The last the firm wants to do is to let its competitors know about its relationships with the supplier. This is where private networks play an important role. Private networks are formed around individual firms' intellectual property and supplier base, protecting critical business relationships. In our network, we've created a foundation where customers can go in and specifically define the relationships they have with particular players and change them dynamically. In our network, firms are able to keep strategic intellectual property from competitors but at the same time collaborate with them by sharing non-strategic information. In addition, we have used Federal Trade Commission-approved techniques to keep away from collusion. And we have created what we call a "Community Non-Disclosure Agreement" to make sure that none of the price information flows back and forth between our buyers and suppliers.

REGIONAL AND GLOBAL ASPECTS OF B2B E-COMMERCE

There is no question that the issues that arise around the diffusion of B2B e-commerce have taken on a global scope, even though there are probably regional differences in the intensity of technology investments, evidence of corporate commitments, the extent of government sponsorship and the potential for value that exists. Our respondents provide insights on the impact of B2B e-commerce in international business. They also offer comments about regional opportunities, especially related to the European Union and to Hong Kong. The latter, as a global trade center, has been a leader in adopting ITs among Asian countries.

Stefan Klein. As a whole, B2B e-commerce is a global phenomenon. It does not have many aspects that are specific to business practices in Europe because companies are trying to expand their activities worldwide. However, in some cases, European B2B software solution vendors appear to be preferred by firms in European countries. For example, firms often prefer to choose products from SAP, which holds a dominant market share in Europe. CIOs feel more confident if they go for the leader and SAP has shown a profound understanding of business needs within companies as well as across industries. In addition, there are numerous discussions about regulatory issues, such as taxation, anti-trust or patent issues, where European traditions and positions might conflict with those of the U.S. The challenge is to find a solution that is acceptable in different regulatory environments and to create a level playing field. Moreover, there are governmental efforts to promote B2B e-commerce adoption, best symbolized in the

European Union's "eEurope Initiative." The European Union countries invest a lot of money to facilitate the diffusion of B2B electronic commerce, mainly on the technology development and the technology acceptance aspects. Global issues are complemented by regional or local issues: B2B is also viewed as having the capacity to facilitate regional commerce development and companies are exploring these opportunities, getting together and discussing opportunities for some kind of innovation partnerships.

Lynne Markus. It is also interesting to observe some of the developments related to B2B e-commerce in East Asia. There are two specific characteristics of Hong Kong businesses that influence the B2B e-commerce practices in Hong Kong [7]. *First*, business establishments are very small. These firms have low levels of IT sophistication, and only a small amount of available resources for implementing B2B e-commerce solutions. As a result, the level of adoption of B2B e-commerce is low in Hong Kong. *Second*, in Hong Kong the level of systematization of information and knowledge is low. Most information and knowledge is stored in the heads of owners. These people are often unwilling to put their knowledge into computer systems. In addition, companies have less trust in employees and in business partners, and this also hinders the use of IT in conducting business with other companies.

As a result, B2B e-commerce in Hong Kong is still in its infancy. Most firms are skeptical about the functions and benefits of B2B electronic markets. So if they do adopt B2B e-commerce solutions, it is for one or two purposes. One is to find out how the B2B electronic markets or B2B e-commerce solutions work, and what are the advantages and disadvantages of these solutions. The other purpose is to search for more information about suppliers and products through these online markets. But purchasing transactions are still done by phone, and it will take a while before we see much change occurring.

Chris Westland. Developments related to B2B e-commerce have been interesting to observe in Hong Kong and China [13]. Hong Kong's B2B e-markets have displayed mixed results, but there are some interesting examples that I think are worth noting. One example of success is the B2B market operated by the large trading company, Li & Fung Limited (www.lifung.com), a traditional intermediary in the import-export business. Li & Fung has been a major global player in textiles, for example, and is arguably one of Hong Kong's most successful companies. Over the past four years, this company has aggressively invested in technology to streamline its supply chain management functions. At the core of this restructuring is a sophisticated B2B e-market that incorporates and plays to Li & Fung's strength in the region. (See Figure 3.)

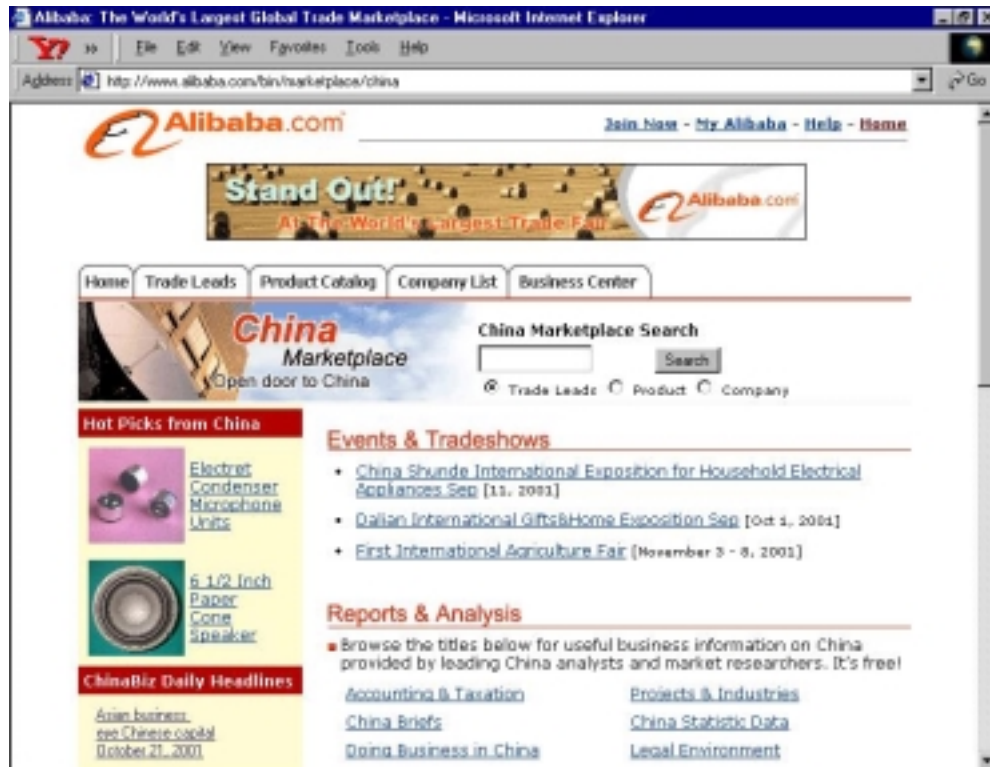
Figure 3. Supply Chain Management Services from Li & Fung Limited in Hong Kong



Source: www.lifung.com, October 20, 2001.

Another new digital intermediary is Alibaba.com (www.alibaba.com), which has about 150 employees, and is an example of a marketplace that emphasizes support for exploring potential counterparties for trade. This B2B market seeks to link commercial buyers and sellers in 27 primary categories, covering the gamut of product areas that we see in international trade in Asia. The company has about 190,000 listed producers throughout Asia, and provides a listing and e-mail-based transaction service. Alibaba expects ultimately to generate revenue through transaction fees, membership fees, and advertising revenue. (See Figure 4.)

Figure 4. Alibaba.com's Regional Procurement Marketplace for China



Source: www.alibaba.com/bin/marketplace/china, October 21, 2001.

My third example is an “impersonator” among B2B electronic markets, but worthwhile to comment on nonetheless. It is iSteelAsia.com (www.isteelasia.com). (See Figure 5.) The core concept behind iSteelAsia is a glorified e-mail system for trading steel. When a buyer wants goods, she can post her requirements through forms on the site. The site then forwards the requirements to all suppliers by e-mail, and they can send back quotes on an anonymous basis. When quotes are accepted, identities are revealed and the trade is then finalized. In practice there must be numerous parameters—other than price and volume—to be negotiated, and so I remain skeptical that B2B exchanges of this nature can take a meaningful share of world trade. They fail to solve some of the key business process issues.

Figure 5. iSteelAsia.com, an E-Mail Messaging-Based Procurement Network



Source: www.isteelasia.com, October 21, 2001.

FUTURE TRENDS AND RESEARCH DIRECTIONS

What lies ahead for B2B e-commerce technology solutions in supply chain management? Now that we have considered the spectrum of issues related to B2B e-commerce, we conclude our discussion with the experts with their readings on the “next wave” in the evolution of B2B electronic markets. We also probed what advice they have to offer to other university researchers about the key issues that should be on their agendas for contributing to what we know about B2B e-commerce. They also considered the extent to which economic theory offers relevant theoretical perspectives for advancing managerial knowledge and for improving our understanding of B2B electronic markets, and offer the following closing thoughts.

Lynne Markus. It is still early to say how B2B e-commerce will develop. But we see that B2B e-markets will play an important role as system providers that offer IT services and skills. Once the adoption of B2B e-commerce takes off, we will come to see changes in industrial structures in the future, although it is early to foresee at present what are the exact changes that will occur.

Chris Westland. I see a number of developments on the horizon. *First*, expect B2B markets to consolidate until there are only one or two markets for any particular product inventory or service market. *Second*, expect the largest B2B market players to be major market participants (either as vendor or

producer, or as a customer) relative to the products sold in that B2B market. I call these *producer-owned markets*. *Third*, expect an increase in government regulation, because the synergies in the second trend will concentrate power in the hands of just a few large producers, who then will be able to profit at multiple points in the value chain. *Finally*, with the accounting profession's recent move to insert "fair value" accounting into GAAP (the Generally Accepted Accounting Principles), expect a growing business of the primary B2B market in a product sector to be the sale of "fair" market prices, and "price-setting" for other B2B markets and sales off-market. This is similar to what we already see with the New York Stock Exchange setting trade prices for after hours trading, for online brokers and for regional exchanges in securities.

Barrie Nault. An important role for B2B e-markets is as intermediaries for information sharing among multiple players in a common business process. An example is that transportation agencies at different locations work together to streamline shipping processes via a collaborative B2B electronic market. We will see similar phenomena as we saw in the development of IOSs and electronic data interchange systems. Like those, B2B e-markets will become more industry-specific. That is, B2B e-markets will be more focused on industry-specific processes because the ways of doing business have been specific to particular industries for a long time.

And due to positive network externalities, electronic markets are a natural monopoly. The automotive e-market Covisint that Peter Weill mentioned earlier in this article, is primarily run by big United States automobile manufacturers, although other manufacturers are joining in. It's a good example of a setting that tends toward a natural monopoly. In transportation, we may see electronic markets that specialize in ocean, motor carrier (road), and rail transportation. We may also see specialized markets by location and by country, for example. With dynamic pricing and reductions in product life cycles—both of which increase market uncertainties—we will see a shift from long-term contracts to contingent long-term contracts where the contingencies are designed to accommodate the market uncertainties.

Peter Weill. Even though we are still in the early days of B2B e-commerce, if we take a look at the potential impact on organization structures, I think it will definitely increase outsourcing. B2B e-commerce will reduce company size: in other words, revenue per employee will go up, but we will "skinny down" companies so that there is a greater focus on core competencies. Because much of this activity will occur outside the company—the B2B e-commerce activity—we will have to see a reengineering of processes and also greater reliance on straight-through processing. So, once these processes are automated, and decision rules are built into the processes, we should begin to see changes occur.

Finally, there is likely to be change in industrial structures. I don't know exactly what is going to

happen to them. But we should see a move to a world where we have virtual value chain that will be accessed by multiple players in the industry, as well as a physical value chain.

There may even be consolidation of information in industry as B2B e-commerce systems integrators coordinate the activities of the value chain and begin to exert some new control of information. Cisco and General Motors, and other large organizations are moving towards that model, for example. They will continue to own the relationship with the customer, and they will have electronic connections to all of the partners they have in the value chain. But they will not own many of the assets. Instead, they will outsource these assets to exchanges and other forms of market transaction models. Thus, there is the long-term potential for significant changes to the industrial structure in many sectors.

Omar El Sawy. There is a definite trend towards collaborative types of transaction and supply chain coordination arrangements in B2B e-commerce—even when B2B exchanges are involved. The *process view* works very well here too because, even when an enterprise's transactions pass through a B2B exchange, what you are really doing is leveraging the business process and reducing its entropy by enabling it to be more efficient, as well as energizing and enhancing it through additional services and broader opportunities. You end up with more possibilities for obtaining value by going through that intermediary. So, the future will see much more collaboration, much more emphasis on information and knowledge exchange, and much more emphasis on business relationships that go beyond transactions. Future research should track and attempt to explain and guide these developments.

Eric Clemons. Two related research areas are promising. One is to find a clear way of characterizing when you want B2B e-commerce to occur through integration and channel coordination, and when you want B2B e-commerce to occur through an exchange. A second issue would be to see what kinds of B2B channel coordination are now possible as a result of the Internet.

Kevin Lynch. For both collaborative logistics and collaborative supply chain management, technology is only a part of the equation. You need to be able to build business processes that make sense for an organization. For collaborative models to work, you need to give the individual firms the ability to execute their business processes with complete freedom, but benefit through a network that makes collaboration: easy to do; easy to measure the benefits of; and, seamlessly integrated with other business processes both in the four walls of a business and across business partners' technical infrastructures.

So what we have done at Nistevio is attack network or market costs rather than individual corporate costs. The job of a network is to uniquely identify inefficiencies that are shared by the community and illuminate them, measure them, and help define a business process that reduces the cost or increases the efficiency of interaction between the firms. In public exchanges the approach typically involves setting standards for communication. In private exchanges like ours, they are standards where our carriers

connect once for every member on the network, and they are also business processes for improved asset utilization. The value of collaboration for our membership is unlocked at the business process level.

The other thing that I see happening purely in logistics is the sharing of assets beyond trucks. For instance, today, shippers and carriers are collaborating around delivery of their product. In the future, they might be co-loading products through shared warehouse space. And the technology does not yet exist to make that happen in a truly effective manner. So I think that, in the next five to ten years, senior management interest in logistics will focus on a key question: How will we use technology to unlock the efficiencies of collaboration in logistics networks. This has been the “Holy Grail” of the third-party logistics industry for the last ten years—bridging their networks to create more value for the customer base. But the real value has yet to flow.

Joel Ronning. We have seen a new trend gaining strength over the past year or so. There is a fundamental and large shift in focus from getting a site up and making it work as a technology tool, to operating B2B solutions as a channel management product and a means to support true community development. The latter offers a real channel—one that you can develop with recurring buyers and loyal clients. As a result, firms are now shifting away from their initial fascination with the Internet as an emerging technology towards a more meaningful focus on the Internet as a business development opportunity and the dynamics of the long-term sustainability of the new business channels it opens up.

Jean Kinsey. For future research, it would be useful to look at individual companies and find out how much savings or reduction in cost those who have adopted B2B e-commerce actually have realized. Has it really made firms more productive, more efficient? Has it lowered their costs of operation? Has it increased their ROI? Has it, in fact, reduced their need for labor, or has it just changed the type of labor that they hire? In other words, are they getting rid of low cost labor and having to hire higher cost labor because of their move to a more technology-intensive approach to supply chain management?

Senior managers will especially want to know about the shape of the *curve of returns* to B2B e-commerce. Does it go up right away? Do you get most of the return in the first two years and then see it tail off? Or is there a slow-building return that really does not take off until five or even ten years later? And how long does it take to get a positive ROI? This is a separate research question because the popular belief up until now is that firms that invest in B2B e-commerce infrastructures *will* have positive ROIs. We need to nail down some facts in this area.

Another research issue is the effects of *compatibility* of computer systems among firms. Incompatible computer systems make transaction costs very high, so investments that involve incompatible systems may not, in fact, reduce transaction costs. On the other hand, interoperable systems enable computer systems on both ends to transmit and interpret each others' data smoothly, lowering transaction costs. So, *transaction cost theory* is probably one economic theory that would be applicable to the investigations.

CONCLUSION

The wide application of B2B e-commerce solutions has opened new channels for firms to transact and communicate with each other, and has encouraged the emergence and evolution of a great number of electronic exchanges and firms that can provide innovative technology and service support. The rapid development of B2B e-commerce engenders our inquiry about the nature of this innovative form of business. In this article, we have presented opinions from more than a dozen people from both industry and university sides, addressing several aspects of B2B e-commerce.

Several of our interviewees have pointed out that B2B e-commerce applications and electronic markets play different roles in different contexts. For example, although exchanges are viable in commodity markets, channel coordination is preferred where there are a limited number of suppliers and variable demand. In addition, the hurdles that firms encounter in adopting B2B e-commerce solutions are not always readily surmounted. Even though advanced technologies attract firms to move to the Internet-based B2B e-commerce solutions with promises of high levels of ROI, still issues of trust, market readiness, investment complementarities and technology standardization seem to be working in concert to hinder the wide adoption of B2B e-commerce solutions.

The next aspect that we believe will become a significant emphasis in the area of B2B e-commerce practice and research is how business processes and supply chains should be managed in the presence of the Internet. Many of our interviewees share the opinion that integrated business processes and improved visibility along the supply chain are important value drivers for implementing B2B e-commerce solutions. Moreover, our interviewees also comment on the value that firms can obtain by adopting B2B e-commerce solutions. Electronic exchanges benefit adopting firms by offering technological skills, network infrastructures, and collaborative solutions to problems shared across a community of firms in an industrial sector. In addition to identifying the various issues in the development of B2B e-commerce, our interviewees also have provided suggestions on appropriate strategies in deploying these solutions. For instance, public trading networks are recommended for sharing non-strategic information while the private trading networks are recommended for sharing strategic information.

Furthermore, B2B e-commerce is diffusing globally, even though there are some differences in market penetration and corporate willingness to invest across different geographical regions. This article points to some of the regional features in European Union countries and Hong Kong that may affect the acceptance of B2B e-commerce. To identify areas for future research, we asked our interviewees to comment on the development trends of B2B e-commerce applications and what they saw as the key issues for research. One trend that was mentioned is that market consolidation leads to natural monopoly where only a few large players will enjoy significant market power. In addition, future research must address such questions as how firms choose different types of B2B e-commerce applications in different

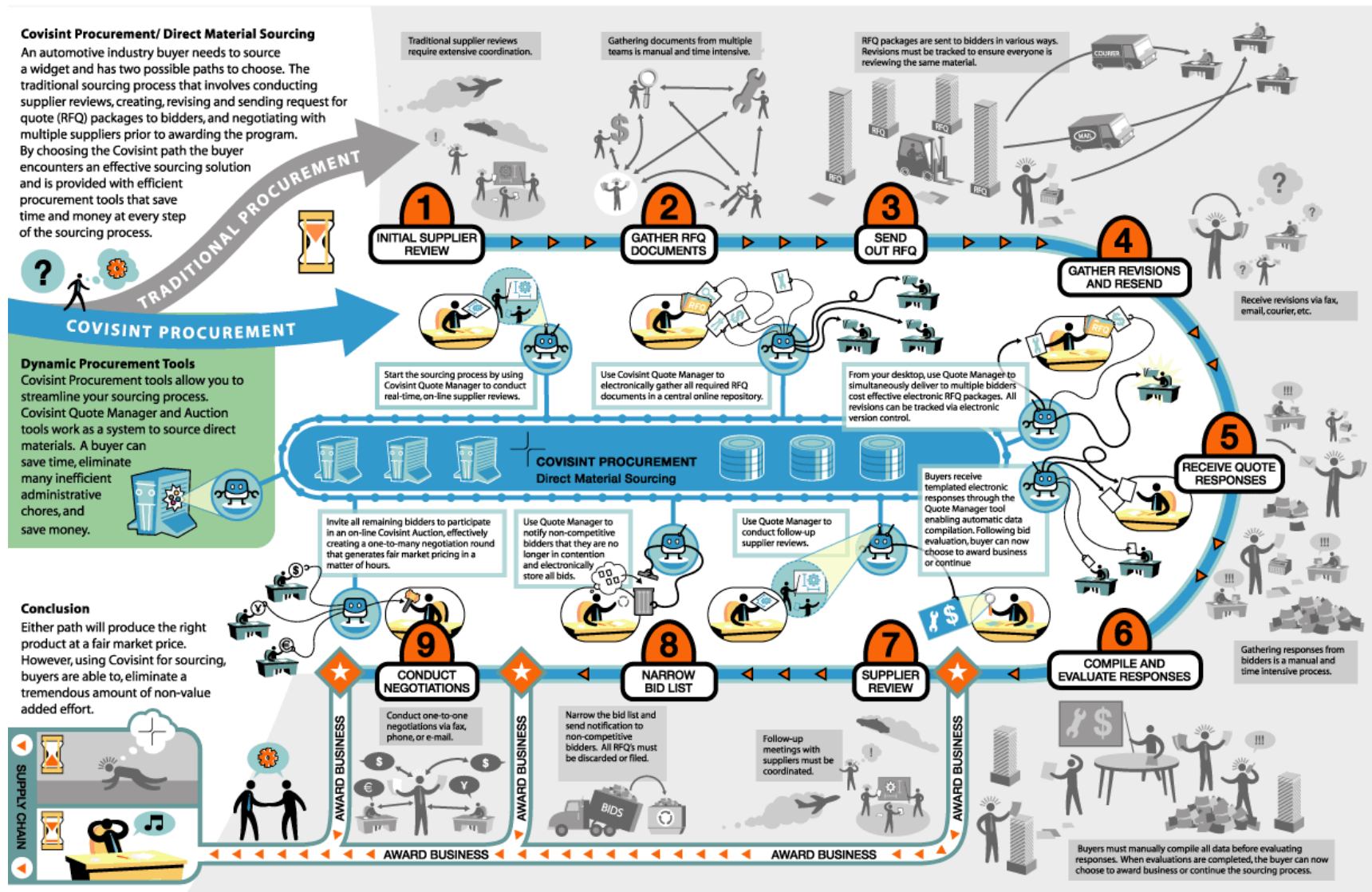
competitive contexts, and how IT solutions can be leveraged to enhance interfirm collaboration.

In summary, our interviews have identified a range of issues for future B2B e-commerce research, and point towards a broad spectrum of economic and organizational perspectives from which to understand them. Our interviewees' insights enrich our understanding of the various aspects of B2B e-commerce, and help us to explore solutions to some of the leading research questions. In addition, the issues discussed in this article are rooted in the daily practice of B2B e-commerce firms and, thus, this article is also able to offer managerial implications to the many organizations that are currently using or are beginning to experiment with the technological solutions associated with B2B e-commerce.

SUGGESTED READINGS

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Figure 1. Covisint's Electronic Procurement and Direct Material Sourcing Process: A Typical B2B E-Commerce Business Process



Source: "Covisint Buyer Auctions, Direct Material Sourcing Process," Covisint LLC, October 22, 2001.
www.covisint.com/solutions/proc/res/proc_dirmat.shtml.