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The Diffusion and Impacts of the Internet And E-Commerce in Taiwan

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SUMMARY

- The most important driver behind e-commerce in Taiwan appears to be international competitive pressure; this is especially evident in the manufacturing sector.
- E-commerce is more widely diffused in the manufacturing sector in Taiwan, compared to the retail/wholesale and financial sectors, which are more domestic-market oriented.
- The primary motivating factor behind e-commerce adoption is to better serve customers, and the Internet also allows firms to improve the efficiency of their internal processes and to enhance staff productivity levels.
- In comparison with manufacturing firms in other countries, Taiwanese firms are more concerned with improving forward linkages to their customers than improving backward linkages to their suppliers.
- The purpose of the adoption of e-commerce is predominantly to broaden their customer base by exploring new marketing channels, or to create competition for the traditional channels.
- This stands in sharp contrast to global firms, which tend to use it mainly to improve the traditional marketing channels.

INTRODUCTION

This is the third phase of a study of the globalization of electronic commerce (e-commerce). In this part of the study, we use a survey of individual firms (GEC survey) organized by the Center for Research on Information Technology and Organizations (CRITO) at the University of California, Irvine (UCI) and our own interviews within the PC and retailing industries in Taiwan to investigate those factors influencing the diffusion and the impacts of e-commerce in Taiwan. Analyses will be made at both the firm and industry levels. We expect to uncover the commonalities and differences across industries. Reference will also be made to international norms based on the GEC survey.

We find that competitive international pressure is the most influential factor driving the diffusion of e-commerce in Taiwan. Industries that have the most exposure to international competition have greater e-commerce diffusion, and because of this exposure, Taiwan's manufacturing firms are in step with the global standard for e-commerce adoption, whereas the domestic market-oriented retailing and financial sectors lag far behind the rest of the world in terms of Internet application. Adoption of e-commerce enables manufacturing firms to better serve their customers, to improve the efficiency of internal processing and to reduce inventory costs, while the emphasis in the service sector is on customer service.

The most significant factor impeding the diffusion of e-commerce is the perceived lack of security and privacy associated with online trading. Taiwanese firms are particularly wary of this issue, probably more for cultural reasons, but also because of the underdeveloped legal framework that supposedly protects electronic trading. The costs of Internet access and website maintenance are also significant factors influencing the speed of e-commerce application. In addition to environmental and cost factors, consumer attitudes are also considered important by the financial sector, as e-banking involves changes in trading habits.

It is also noteworthy that the diffusion of business-to-consumer (B2C) e-commerce differs completely from that of business-to-business (B2B) e-commerce, in that the former appears to be a purely local phenomenon while the latter is global. Local conditions, including social, business and cultural factors, are shaping the path of development of B2C e-commerce. The Taiwan experience indicates that product innovation is the key to successful B2C operations with logistic services apparently being a universal bottleneck to such development. Due to the underdevelopment of e-logistics, the volume of B2C e-commerce remains at a negligible level

and limited only to trading in intangibles. There is, however, ample scope for product innovation that may eventually overcome this bottleneck to reach new consumers. On the other hand, international forces mainly drive the diffusion of B2B e-commerce. Market competition prompts Taiwanese firms to adopt new technologies that enable new types of trading. This is particularly evident in the manufacturing industry where Taiwanese firms serve mainly as international subcontractors. The development of B2B in the retail and finance sectors is relatively slow because these sectors are oriented toward domestic consumers.

BACKGROUND AND A *PRIORI* EXPECTATIONS

Background

Taiwan has been quite successful in promoting Internet usage within households; having achieved a 35.6 percent penetration rate by the end of 2001, Taiwan's Internet usage level is one of the highest in Asia, with broadband accounting for 14.5 percent of all Internet connections on the island. The most important factor contributing to the rapid diffusion of the Internet appears to be the high literacy rate amongst Taiwan's population. As in other countries, Internet access in Taiwan started with the population's younger generation, with schools being the places where students first encounter computers. Many parents learn about the Internet as a result of watching their children experimenting with it; however, the most common Internet activities in Taiwan remain unchanged, as younger people continue to spend much of their time sending e-mails and chatting online with friends or unknown Internet 'pals' on their computers. Internet users have, in effect, formed a separate community outside their families and neighbors, which is clearly regarded by them as serving the useful purpose of an 'escape' from real life. The younger generation is also apparently the major driving force behind broadband penetration as the demand for online gaming over the past two years has boosted the demand for bandwidth.

B2B commerce is still at a low level in Taiwan, as it accounted for only 1.4 percent of GDP in 2000. It was first applied to the transmission of product information, and then to price inquiries and quotations, functions that, in most cases are adequately performed by e-mail. Having then progressed to order placement and order tracking, some investment in hardware and software became necessary, and users could choose between the Internet and exclusive lines as their transmission channel, with the Internet being apparently more popular because of the cost advantage. The government subsidizes investment in hardware and software, but the greatest investment is in the area of internal adjustment to work routines in order to

accommodate these electronic transactions. Prompted by the financial incentives offered by the government, a group approach to such adjustment is generally adopted by Taiwanese firms. The government took advantage of two existing institutions to promote the group approach to B2B trade, namely, the network of subcontractors surrounding the major foreign buyers and the core-satellite system formed around domestic manufacturers; the existing network relationships are the major facilitators of this group approach (Chen 2001).

The establishment of electronic trading networks has strengthened the network relationship, reduced the costs of coordination, significantly reduced inventory levels, and accelerated the time to market. Therefore, Investment in information systems has enhanced the competitiveness of the network as a whole.

As a proportion of consumer expenditure, B2C commerce in Taiwan remains at a negligible level, with online shopping currently accounting for only 0.4 percent of consumer expenditure, as compared to 1.64 percent in the US (Liu 2002). Two major factors apparently inhibit the diffusion of B2C commerce, online security and the wide range of readily available retail stores in Taiwan. For those consumers who are reluctant to shop online, security remains the paramount concern, since they are concerned about the possible leakage of sensitive personal and financial data when engaging in online transactions. In addition, consumers worry that they may be cheated when buying something without actually being able to view the item. The policy on returns amongst 'electronic stores' - and for that matter, real stores in Taiwan - has always been, at best, vague. Taiwanese consumers are also spoiled by the dense distribution of retailers within their neighborhood, which makes the substitution of conventional trade extremely difficult.

Key Factors Influencing E-Commerce Diffusion

Although to some extent, B2B e-commerce can develop independently of Internet penetration as exemplified in the era of EDI, B2C e-commerce depends critically on Internet diffusion amongst households. At present, both B2B and B2C command only a small proportion of overall trading in Taiwan, although the proportion of B2B commerce is slightly greater.

The international environment is apparently the most important factor influencing B2B e-commerce in Taiwan. As an open economy with significant exposure to international competition, Taiwanese firms adopt online trading, data exchange and work coordination as the means of supporting their work with international business partners operating via digital information networks. This is particularly evident in the case of the PC industry where global

logistics has become the norm for industry operation, and Taiwanese firms are forced to adapt to this new style of trading just to remain in the game. The new trading style then trickles down to working relations between Taiwanese subcontractors and their suppliers, triggering the reconstruction of the supply chain networks and changes to the way they work. However, within supply chain management, there is a considerable lag in advancements in Internet application as compared to the progress made in forward linkages to international buyers, which is why the Taiwanese government designed the island's subsidized A and B Projects in order to facilitate the process of transformation. The A project encourages the construction of electronic trading systems between international buyers and major Taiwanese subcontractors, while the B project encourages the construction of such systems between the major subcontractors and their suppliers (Chen 2001).

The importance of competitive pressure from the international markets is somewhat self-evident, because the industry, within which the diffusion of e-commerce is most prevalent in the rest of the world, is also the industry that is most receptive to online trading in Taiwan. For example, in global manufacturing, those industries demonstrating the greatest uptake of e-commerce are the information, aerospace and defense, automotive, metals and chemicals industries (Chen 2002); in Taiwan, the information, automotive and chemicals industries are also the ones that are most active in online trading.

Firm size is also an important determinant of a firm's propensity to invest in ICT facilities. Economies of both scale and scope in ICT favor large firms, which is why uptake within the metals industry is relatively slow. The industry is dominated by small and medium enterprises (SMEs). Those firms that are more globalized, in terms of their worldwide production facilities, are also more receptive to online trading. In short, globalization is a key driving force in the overall diffusion of B2B e-commerce.

In terms of accelerating the diffusion of e-commerce, the national environment reinforces the international environment. In recent years, Taiwan's traditional export industries have suffered from rising wages, thereby undermining the island's international competitiveness. However, both the Taiwanese government and firms operating in Taiwan soon discovered that ICT was a useful means of regaining international competitiveness which led to the government's launch of the 'Regional Operations Center' (ROC) program in 1995, in an effort to modernize Taiwan's service sector, particularly in the areas of telecommunications, shipping and finance. Following the loss of its former cost advantage and improvements in logistics are considered to be critical to the salvation of Taiwan's manufacturing industry. The efforts of the

government coincided with the massive relocation of manufacturers into China and Southeast Asia, from the mid-1980s onwards. Business firms soon found that combining their regional production facilities with Taiwan's logistics capabilities through a digital network was a useful means of protecting their position in international subcontracting (Chen 2001). A digital network that enables instantaneous and accurate management of production and product-related services enhances the value of a subcontractor, making it difficult for the subcontractor to be supplanted within the industry. The interconnection of the digital network with the information hub of the major players in the world markets also allows Taiwanese manufacturers to engage in product innovations, a path which they were previously unable to tread. For example, Taiwan's notebook computer industry invented the model of "Taiwan Direct Shipment" (TDS) whereby a custom made computer is delivered directly to the sales point designated by the international buyer through air-freight, circumventing the traditional "add-on" process before shipment and warehousing (Chen 2002).

Government policies are only useful to the extent that they accelerate the process of transformation towards a new era; they are neither powerful enough to create a new environment which did not exist before, nor capable of reversing the business trend or the comparative advantage of a country. In supporting B2B e-commerce, the Taiwanese government's main policy has been tax incentives and subsidies, with investment in ICT technologies, including hardware, software and personnel. Training expenses are also eligible for investment credits. The government encourages a group approach to e-commerce, using a subsidy program to promote this approach.

However, these policies are effective only to the extent that both the external and internal environments are ripe for firms to accept the new style of B2B transactions. The government's efforts to promote the diffusion of e-commerce have had some success in terms of establishing an interface between Taiwanese and international firms, but less success in establishing a corresponding interface amongst Taiwanese firms. The efforts to bring the financial, shipping and service industries into the digital networks that coordinate production may prove fruitful, because this adds important value to the network, which in turn, should encourage small firms to sign up.

The area of B2C e-commerce demonstrates a completely different story. Internet diffusion is a precondition to B2C e-commerce since the 'electronic store' is critically dependent upon the penetration of the Internet. However it will take more than just online trading to promote Internet access; indeed, it is often other non-trading activities that will have the greatest effect.

In the case of Taiwan, it is generally chatting and electronic communications that first bring the younger generation onto the Internet and thereafter, online gaming that prompts the penetration of broadband. It is clear that once the Internet population is large enough to secure an opportunity for the realization of scale economies, B2C commerce will start to emerge.

Since the aim of B2C e-commerce is either to replace or supplement real-time shopping, it offers some advantages that real-time stores cannot offer, or at least, neutralizes some of the advantages of the real-time stores. For example, real-time stores are able to present the actual commodities for evaluation by viewing and touching, an overwhelmingly important advantage over the B2C alternative whereby the quality of the products can only be appreciated visually. It is therefore natural for B2C e-commerce to begin from a position of trading in intangibles, such as travel arrangements and ticket reservations. It is almost universally the case that in the initial phase of B2C trade, travel services tend to dominate (III, 2002, p.111).

The advantage of electronic trade vis-à-vis face-to-face transactions is the ability to reach distant and widely dispersed consumers. Products such as books, music and cosmetics, are therefore also important items in online trading. A second advantage of e-commerce is that it can offer highly differentiated products in small volume to a small number of consumers because of the significant savings on fixed costs, such as rental charges for store space. It is therefore able to exploit small pockets of consumers scattered across the country. In this regard, e-commerce stands in sharp contrast to real-time stores whose customers are typically geographically concentrated.

The necessary payment mechanism stands out as the most difficult hurdle to overcome in the diffusion of B2C e-commerce. Although credit cards are widely used in Taiwan, the security of online credit card usage remains shaky, and thus, effectively discourages this mode of payment in electronic trading. As a result, separate payment mechanisms have to be created to supplant electronic trade; however, post offices, banks and convenience stores have served this purpose well.

It seems that a legal and financial environment which offers secure and convenient mechanisms for payment for online trading is the most important factor influencing the diffusion of B2C e-commerce; however, both legal protections and electronic banking are currently lacking in Taiwan. Although an electronic signature law has been promulgated, the detailed provisions defining the rights and obligations of sellers, buyers and intermediaries have not yet been made available, and it is clear that B2C e-commerce will not take off until

this environment is firmly established.

The business sector has nevertheless found some ways of overcoming the difficulties associated with payments through a combination of virtual and actual operations. Convenience stores which are spread across the whole of the island and which are able to offer combined services comprising of product delivery, account settlement and product returns appear to be the most appropriate solution to the problem. Such a combination also ensures that the role of the convenience stores is reinforced rather than diminished by e-commerce.

Implications of the Diffusion of E-Commerce

The diffusion of e-commerce has a number of significant implications for the functioning of the market as well as the organization of production. In the case of B2B e-commerce, supply chain management becomes an important element for competitiveness, since production is vertically disintegrated and may be spread out over a wide geographical distance. However, since production activities need to be closely coordinated with digital information networks, such a production system imposes entry barriers to new players; global production is therefore likely to be dominated by a small number of firms that are at the core of the production networks. Nevertheless, recent research (e.g. Leamer and Storper 2001) has shown that although production has now spread to areas that are remote from the market, it is likely to be concentrated in certain regional clusters. In other words, network economies seem to be a local phenomenon (Hicks and Nivin 2000). The implication of such a finding is that any country that falls behind in the adoption of information and communications technologies may find itself left out of the global production system. Thus, the government has an important role to play in terms of establishing the necessary infrastructure for the operation of electronic trade.

Digital information networks eliminate the information barriers and allow larger companies to control a larger amount of production on a global scale, in consortium with its suppliers and subcontractors. Digital information networks also enable these larger companies to enjoy economies of scope, within which an array of differentiated products can be produced, which cater to the specific needs of individual consumers. So what room is left for small firms? Given their disadvantages in the scale and scope of products that they can offer, it appears that they will have to compete on the basis of their technological capabilities alone. Small firms can, of course, only excel in a limited area of technologies, whereas large firms can specialize in systems integration building on the technologies possessed by the small firms; thus, we have the formation of a technology chain driving industrial innovation. In short, the diffusion of B2B e-commerce has the potential of redefining the division of labor between countries and

thus, reevaluating the roles of individual firms. In the case of personal computers, for example, although the 'product life cycle' is at work and continuously driving production from high-wage to low-wage countries, production has nevertheless been concentrated in just a few countries. Information technology together with lowered transportation costs has made offshore sourcing an effective way of serving the market. China, in particular, has emerged as a major supplier of PCs in recent years, not only because of its low labor costs, but also because of the readily available skilled labor with the ability to take on the most technologically demanding jobs, and further because of the support from Hong Kong and Taiwan which provide it with the necessary logistics and design capabilities. Extensive application of e-commerce is made to connect the logistics and design centers with the production sites in China.

Other low-wage countries have found it difficult to compete with China in PC manufacturing due to their lack of capabilities beyond low labor costs, and indeed, within China, PC subcontractors are assuming the whole gamut of responsibilities from product design to after-sales services on a global scale. In order to effectively perform such duties, these subcontractors have to organize a sub-network of their own. Thus, it appears that in the information age, it is the possession of a set of capabilities, rather than a single factor such as labor or capital, which will define the comparative advantage of a nation.

The experience of B2C e-commerce seems to suggest something very different from that of B2B e-commerce. Although still at an embryonic stage, B2C e-commerce has not yet shown any potential for replacing traditional markets and institutions. Even in the case of the US, B2C e-commerce is still groping for appropriate and viable market strategies, with most dot.com companies having incurred heavy losses. As noted earlier, in the case of Taiwan, a combination of virtual and actual stores seems to be the solution in the current business environment. Since online trading allows a seller to reach distant and dispersed consumers, making small volume transactions possible, it therefore addresses the needs of the small and distant consumers who often find themselves neglected by the conventional markets. Thus online trading should be seen as a complement to, rather than a substitute for, conventional commerce.

Although the volume of e-commerce still accounts for less than one percent of retail trade today, its importance will undoubtedly expand in the future when appropriate products and transaction modes can be identified; nevertheless, it is unlikely that the level of B2C trade will ever match that of B2B trade, which is eventually expected to account for half of all trade between businesses. It seems likely that new products which cannot be offered by

conventional stores will be the key to the future development of B2C e-commerce, the magnitude of which is also likely to be determined by the demand for such products. Obvious candidates in this category are online imaging services, including video on demand, online games, and the like. New product innovations will also be the most important area of competition between countries interested in developing e-commerce, with industrial policy, rather than Internet-related policies, being set to play a major role.

METHODOLOGY

This study draws on two sources of data, the first of which is survey data compiled by UCI on ten countries, including Taiwan. The Taiwan survey covers 202 establishments, of which 69 are in the manufacturing sector, 66 in the retail or wholesale sector, and 67 in the banking, insurance or other finances sector. All 202 establishments have adopted Internet in their business operations. The survey, therefore, reveals the roles and functions of Internet rather than explains the Internet acceptance. According to the UCI definition, firms employing 250 persons or more are designated as large firms, and those employing less than 250 are designated as small firms. The Taiwan sample includes 102 large firms and 100 small firms, and the average number of employees is 86.1. Firms in the sample are fairly globalized, as 60.4 percent of these firms have other establishments outside of Taiwan, 23.8 percent of them have headquarters outside of Taiwan and 70.3 percent of their sales are generated from overseas.

In addition to the survey data, we also conducted interviews with Taiwanese firms to establish the basis for the industry. One of the industries that is studied intensively here, the retail industry, is reported in the Appendix to this paper, with the findings from the industry study being generally incorporated into the paper.

E-COMMERCE READINESS

Information Infrastructure

PC ownership in the business sector is at a very high level, as the average firm from the Taiwanese sample owned 40 PCs, with the financial sector having the highest ownership, at 67 PCs per firm. The manufacturing sector follows with an average of 51 PCs and the retail/wholesale sector trails with an average of 29 PCs. All firms in the sample indicated the wide use of e-mail at the present time; however, in terms of Internet applications, Taiwanese firms lag behind the rest of the world. Only 57.1 percent of Taiwanese firms have established a

website, well below the global average of 80.5 percent. Moreover, only 51.2 percent of Taiwanese firms have established an intranet, also well below the global average of 63.5 percent, and only 30.1 percent of Taiwanese firms have established an extranet, still below, but nevertheless close to, the global average of 31.4 percent.

The fact that Taiwan lags behind in Internet applications can be attributed to the underdevelopment of the retail/wholesale sector; indeed, manufacturing firms in Taiwan are in fact on par with the global average in terms of website establishment and intranet applications, and even ahead of the rest of the world in terms of extranet applications, thus, it is the retail/wholesale sector that tends to drag down the overall average (see Table 1). Only 42.9 percent of Taiwan's retail/wholesale firms have established an intranet, compared to the global average of 63.3 percent; and only 16.8 percent have established an extranet, compared to the global average of 33.4 percent. This provides apparent confirmation of our previous argument that international competitive pressure is an important driving force for Internet penetration and e-commerce. The manufacturing sector is export oriented and is forced to adopt e-commerce to conform to the global environment whereas the retail and finance sectors are domestic-market oriented.

Table 1 Internet applications in Taiwan and the rest of the world, by industry (percent)

	Manufacturing		Retail/wholesale		Finance	
	Taiwan	Worldwide	Taiwan	Worldwide	Taiwan	Worldwide
Website	74.4	80.5	46.7	69.9	62.0	81.5
Intranet	62.3	63.5	42.9	63.3	62.0	66.5
Extranet	54.0	31.4	16.8	33.4	29.0	32.4
EDI	27.0	43.0	16.3	45.2	42.7	42.2
Call Center	27.5	32.6	12.4	31.3	27.6	32.3
EFT	22.0	40.7	15.5	42.1	34.4	62.3

Note: EFT stands for electronic funds transfer.

Source: GEC Survey, CRITO, University of California, Irvine.

As compared to the other two sectors, the retail/wholesale sector is the one that is least affected by international pressure whereas, in contrast, the manufacturing sector is the most internationalized amongst the three sectors, and is therefore the most affected by international competition, and consequently, is also the closest to the global norm.

Nevertheless, the finance sector is ahead of both the manufacturing and retail/wholesale sectors in terms of EDI usage. At 42.7 percent, the EDI adoption rate in the finance sector is even slightly higher than the global average of 42.2 percent. This points to the fact that Taiwanese manufacturers are more recent adopters of e-commerce and therefore are bypassing EDI to use Internet. In contrast, financial institutions adopted e-commerce earlier in the age of EDI and are locked in the old technology. Moreover, the majority of EDI usage in the finance sector is established within private networks, as opposed to the Internet. In contrast, EDI usage in the manufacturing sector is almost equally divided between private networks and the Internet. This implies that there are deeper concerns in the finance industry than in the manufacturing industry over the security problems associated with information exchange. Despite the wide acceptance of EDI, Taiwan's finance industry remains far behind the rest of the world in terms of the adoption of electronic funds transfer, with only 34.4 percent of the sample firms making use of this technology, as compared to the global average of 62.3 percent. The manufacturing and retail/wholesale are also using EFT sporadically. Again, Taiwan's finance industry was only opened up to global competition in recent years and still remains highly regulated.

Taiwan's retail/wholesale sector is also well behind the rest of the world in terms of customer servicing through call centers, since only 12.4 percent of the sample firms have established such facilities, as compared to the global average of 31.3 percent. Although the manufacturing and finance sectors are also behind the rest of the world in this regard, the distance separating them from their global counterparts is not as great as in the retail/wholesale sector.

Although Taiwan is a major producer of IT hardware, the island as a whole spends a trivial amount of its income on IT equipment and software. In 2000, Taiwan spent only 1.47 percent of its GDP on IT products, well below the average of 3.60 percent in the OECD countries (Chen 2001). A survey by the GEC indicated that the average Taiwanese firm spent around 9.3 percent of its 2001 operating budget on IT equipment and software. Of the three sectors analyzed, the highest proportion of IT expenditure was allocated by the manufacturing sector, at 12.1 percent, followed by the retail/wholesale sector, at 8.5 percent and the finance sector, at 7.3 percent. Within their overall IT budgets, only a small proportion was devoted to web-based applications, including software, consulting, Internet staff, and the like. On average, only 10.2 percent of the budgets were devoted to web-based applications and amongst the three sectors, the finance sector topped the list devoting 17.1 percent of its IT budget to this area.

The number of IT professionals within Taiwanese business establishments is also small. On

average, Taiwanese firms employ only three IT professionals, but again, the average number is dragged down by the retail/wholesale sector, within which the average number of IT employees is only two. In comparison, the average manufacturing firm employs around five IT professionals, and the average financial institution employs six. Nevertheless, both the IT budget allocation and the number of IT employees per firm clearly indicate that web-based applications have not occupied a priority position in the business planning activities of Taiwanese firms. This is particularly evident in the area of business-to-consumer services, which is covered in the following section.

As the GEC survey indicated, most Taiwanese firms are not yet ready for e-commerce. Although the manufacturing sector has come close to the world average in Internet usage, and is even ahead of the world average in terms of establishing extranets, the retail/wholesale and finance sectors still lag far behind. The degree of openness in the manufacturing sector may well explain its readiness to the standard practices of the global community, whereas the underdevelopment of the other two sectors, with particular reference to the retail/wholesale sector, may be explained by the degree of insulation which these sectors have from global competition and the prevalence of small traditional retail stores on the island.

KEY BARRIERS AND INCENTIVES

Our survey revealed two very significant factors considered by Taiwanese firms to be fundamental barriers to e-commerce, the issue of security and privacy, and the level of legal protections for traders (see Table 2). Although the problem of security and privacy is also the chief concern for the rest of the world, amongst Taiwanese firms this concern has achieved overwhelming proportions.

Table 2 Barriers to e-commerce in Taiwan and the rest of the world, by sector (percent)

	Manufacturing		Retail/wholesale		Finance	
	Taiwan	Worldwide	Taiwan	Worldwide	Taiwan	Worldwide
Need for Face-to-Face Interaction	30.8	31.5	43.8	34.2	18.0	33.8
Privacy & Security Issues	64.9	47.1	65.4	40.4	74.2	44.2
Customer's Readiness	21.2	30.3	34.4	33.1	40.7	31.4
Finding Appropriate Staff	24.9	23.8	32.0	28.8	8.5	26.5

Credit Card Usage	23.2	22.4	15.8	19.9	16.7	20.3
Costs of Website Maintenance	34.1	32.6	49.8	34.9	26.9	33.6
Organizational Change	16.9	23.8	19.2	24.8	10.9	23.9
Formulation						
Business Strategies	14.1	28.0	28.1	23.7	32.8	24.8
Costs of Internet Access	30.7	13.5	23.1	16.3	16.0	15.1
Business Laws	25.5	27.6	24.8	22.6	48.1	24.2
Taxation	22.2	14.0	12.4	18.8	31.1	16.5
Legal Protection	44.2	37.3	53.8	33.6	34.1	34.1

Note: The figures are percentages of the correspondent establishments that consider the factors to be ‘significant’ or ‘very significant’ barriers to e-commerce.

Source: GEC Survey, CRITO, University of California, Irvine.

Amongst all of the companies surveyed, 66.3 percent pointed to the issue of security and privacy as being either a ‘significant’ or ‘very significant’ barrier to their acceptance of e-commerce, well above the global average of 44.2 percent. Of the three sectors, the finance sector is the one that is most wary of the problems associated with security and privacy. Such concerns can be attributed partly to the social environment within Taiwanese society, where privacy is not universally respected, and as such electronic exchange may render privacy even more vulnerable, and partly to the lack of legal protections in Taiwan. The latter is apparent from the listing by Taiwanese firms of ‘a lack of legal protection’ as a major barrier to e-commerce. Amongst all the firms surveyed, 48.5 percent indicated that inadequate legal protection was a ‘significant’ or ‘very significant’ barrier to e-commerce, as compared to the global average of 34.1 percent.

While all firms are concerned about the issue of security and privacy, it is more prevalent in the finance sector than in the other two sectors. In comparison, the problem of inadequate legal protections for electronic trade is most worried by firms in the retail/wholesale sector. It is of course understandable that the issue of security and privacy takes precedence in financial transactions since concerns over such issues can impede the acceptance of electronic banking by consumers. On the other hand, legal protections for traders are also critical for B2C commerce; the prevalence of counterfeit credit cards is a major headache for B2C traders at the present time, with the inherent difficulties involved in sellers pursuing claims against delinquent consumers being another.

In addition to these two factors, there are three other factors that are regarded as being

significant by more than 30 percent of the sample firms. First of all, although in the rest of the world, the need for face-to-face contact is also considered to be important before engaging in a trading relationship, in Taiwan, such contact seems to have greater importance in the retail/wholesale trade, but less importance in financial activities. This may have something to do with the nature of the industry, since small neighborhood stores dominate the retail industry in Taiwan, while the financial sector is dominated by nationwide, as opposed to local, institutions. Therefore, although personal contact appears to be critical to retail trade, it is apparently less so in financial transactions. The nature of the products traded in the industry is another factor that explains the difference. With the lack of consumer protection laws, the consumers prefer to inspect the products in the store before purchase. But inspection is unnecessary in the case of financial transactions.

Secondly, there are two cost factors which are also considered significant, the costs of Internet access and the cost involved in website maintenance. The cost involved in website maintenance is of particular concern to retailers and wholesalers because this sector is dominated by small firms which lack the capacity to hire IT professionals. It is nevertheless surprising that, although the cost of Internet access in Taiwan is comparable to the cost in the rest of the world, it was considered significant by 30.7 percent of the surveyed firms in the manufacturing sector, as compared to the global average of 13.5 percent. Clearly, Taiwan's manufacturing firms may be overly cost-conscious because they are operating on razor-thin profit margins.

It is also noteworthy that the readiness of customers was considered to be an important barrier to e-commerce within the finance sector, but not so within the manufacturing sector. This is because the former deals with domestic customers, while the latter relies more upon international customers. The fact that domestic consumers are not ready to accept electronic financial transaction is therefore considered by 40.7 percent of the surveyed banks and other financial institutions to be a 'significant' or 'very significant' barrier to e-commerce, well above the global average of 31.4 percent. This implies that in preparing for e-commerce, consumer education is just as important as the build up of IT infrastructure. In contrast, the finance sector has few concerns with regard to securing appropriate IT staff for conducting e-commerce, reflecting their IT readiness as noted earlier.

Taiwanese firms are less concerned with the necessary organizational changes to accommodate e-commerce operations, which may be attributable to the flexibility of Taiwanese firms, a trait considered to be their major strength in international competition.

Nevertheless, in terms of establishing ways of formulating appropriate business strategies to make their e-commerce operations a success, it is of equal concern to both Taiwanese and global firms, at least in the finance and retail/wholesale sector. As will be discussed later – in our case study of Taiwan’s retail industry – one of the keys to successful e-commerce is the availability of appropriate products, as opposed to changes in trading modes, and offering new products necessitates the adoption of new business strategies.

In the area of policy, taxation is considered to be very important by the financial industry, whereas, just as in the rest of the world, the other two sectors consider taxation to be of minor significance. Although the banking sector has been temporarily exempted from business tax in Taiwan, there are now calls for the restoration of this tax. Furthermore, securities transactions have also been temporarily exempted from capital gains tax, but this tax still has a basis in law and is likely to be restored soon; this may explain why the financial industry is more sensitive to the issue of Internet tax than the others.

The same explanation can also be extended to business laws, since the financial industry in Taiwan is in a state of flux, with the government currently breaking down the walls between banks and other financial institutions. A universal banking service industry is emerging in Taiwan, paving the way for electronic banking, with some of the leading private banks, particularly those offering personalized financial services to consumers, using electronic banking to facilitate their services. The legal framework and relevant regulations will undoubtedly shape the future development of the industry.

In sum, Taiwanese firms consider the business environment and the laws which aim to protect the security and privacy of traders the most important conditions for e-commerce, with the lowering of Internet access and website maintenance costs also being regarded as useful facilitators for e-commerce. Tax and business laws are considered important by the financial sector, in addition to the education of customers. Accepting the new modes of transactions is also important to the further diffusion of e-banking.

As to the drivers of Internet use, both the manufacturing and retail/wholesale sectors consider ‘to improve coordination with customers and suppliers’ to be most important, just like the correspondents in the rest of the world. However, in the finance sector, customer demand and competition are considered the most important drivers. The percentage of correspondent establishments consider customer demand to be significant (65.1 percent), being much higher than the overall sample (36.7 percent). This is probably explained by the intense competition in Taiwan’s banking sector that is over-crowded with small-size, inward-looking banks.

Significant driving forces considered by Taiwan's manufacturing sector are essentially the same as the rest of the world, but those considered by the retail/wholesale sector are slightly different. Both customer demand and the inspiration to enter new businesses or markets appear to be more important drivers in Taiwan's retail/wholesale sector compared to the world average. This again, probably reflects the local focus of Taiwan's retailers and wholesalers, who seek to expand their market reach through Internet. All Taiwan respondents also give more weight to government incentives as drivers for Internet adoption, indicating stronger role of government in business decisions.

Table 3 Internet drivers in Taiwan and the rest of the world (percent)

	Manufacturing		Retail/wholesale		Finance	
	Taiwan	Worldwide	Taiwan	Worldwide	Taiwan	Worldwide
Customers demanded it	37.7	35.4	49.8	37.6	65.1	36.7
Major competitors were on-line	35.7	31.2	37.5	29.2	58.8	47.6
Suppliers required it	28.0	26.5	35.9	21.3	27.9	12.6
To reduce costs	46.2	42.8	40.2	32.3	34.2	34.3
To expand market for existing products/services	42.8	51.0	49.8	45.6	42.4	53.0
To enter new businesses or markets	49.5	39.2	59.7	44.4	42.2	35.6
To improve coordination with customers & suppliers	52.1	50.8	52.0	40.5	34.0	39.9
Required for government procurement	29.6	19.1	20.2	13.7	17.8	11.4
Government provided incentives	25.6	10.5	27.8	7.4	39.4	6.7

Note: The figures are percentages of the correspondent establishments that consider the factors to be 'significant' or 'very significant' barriers to Internet use.

Source: GEC Survey, CRITO, University of California, Irvine.

DIFFUSION OF E-COMMERCE

E-Commerce Diffusion

The development of e-commerce has been painfully slow in Taiwan. In 2000, the IDC estimated that B2B trade stood at around \$2,302 million, with B2C trade being estimated at just \$372 million; indeed, the total amount of e-commerce accounted for only 0.87 percent of the island's GDP. Nevertheless, the prospects for further development of e-commerce seem to

be good. According to estimates by the Institute of Information Industry (III, 2002: 97), 4.6 percent of Taiwan's large enterprises (employing 300 or more workers) had introduced online sales in 2000, a figure which is expected to reach 9.66 percent in 2002. Meanwhile, the proportion of large enterprises that had introduced online procurement was around 5.1 percent in 2000, a figure that is also expected to rise, reaching 8.26 percent in 2002.

B2C trade is also expected to grow rapidly; indeed, B2C trade expanded by 127 percent from 2000 to 2001, and is expected to grow at a compound rate of 76 percent from 2000 to 2004 (III, 2002: 110). There are also rapid developments in e-marketplaces. In 2002, 19 e-marketplaces were registered under the umbrella of the government-run Taiwan Industry Marketplace (TIM). Although all 19 e-market places are organized by domestic firms, they are oriented towards export trade with estimated annual trading volume of NT\$120 billion (about \$3.4 billion).¹

The functions of the Internet applications of Taiwanese firms are similar to those of the rest of the world, but there are significant differences between industries. As in the rest of the world, the Internet is invariably used for advertising and marketing purposes; however, although this is common across sectors in the rest of the world, advertising and marketing purposes were the dominant Internet applications only in the retail/wholesale sector in Taiwan. Indeed, in the manufacturing and finance sectors, after-sales services were the predominant function. In other words, the Internet is used by Taiwanese firms for customer service more often than it is for product promotion. Manufacturing service is in fact a 'catch phrase' used by Taiwan's manufacturers to highlight their intention to add value to their products through enhancements to their quality of service, for which the Internet is of course a useful tool. The keenness of manufacturers on after-sales service is indicated by the fact that 78.7 percent of manufacturers use the Internet for such services, well above the global average of 48.4 percent (Table 4). In contrast, only 21.2 percent of the retail/wholesale firms use Internet for after-sales services. This suggests that after-sales services are not a key factor in competition as Taiwan's densely spread retail stores compete on proximity to consumers. Apart from advertising and after-sales service, the Internet is also frequently used for the purpose of exchanging operational data with suppliers and customers. The difference between sectors in this regard is small; with the one exception that the retail/wholesale sector uses the Internet to interact with suppliers or to integrate business processes with others sparingly. This suggests that supply chain management has not taken hold in the retail/wholesale trade sector in Taiwan.

¹ See: Commercial Times, 12 November 2002.

Table 4 Internet application functions in Taiwan and the rest of the world, by sector (percent)

	Overall		Manufacturing		Retail/wholesale		Finance	
	Taiwan	Worldwide	Taiwan	Worldwide	Taiwan	Worldwide	Taiwan	Worldwide
Advertising & Market Purposes	51.6	55.8	68.9	55.8	45.9	57.1	31.9	68.3
Online Sales	34.6	25.1	41.2	25.1	25.2	31.9	63.3	33.0
After-Sales Service	44.4	48.4	78.7	48.4	21.2	40.7	65.1	48.3
Online Purchases	28.7	43.4	24.9	43.4	29.1	47.8	37.2	52.5
Exchanging Operational Data with Suppliers	44.6	49.9	53.9	49.9	37.7	48.0	53.4	41.9
Exchanging Operational Data with Customers	47.4	53.4	46.9	53.4	46.1	49.0	54.8	52.5
Integrating Business Processes with Others	25.5	26.8	25.7	26.8	24.9	37.5	27.4	33.5

Note: Choices are multiple.

Source: GEC Survey, CRITO, University of California, Irvine.

Exchanging operational data with suppliers was regarded as most important in the manufacturing sector where 53.9 percent of the sample firms use the Internet for this purpose. This is a manifestation of the manufacturers' urge to coordinate their operations with suppliers to cut production costs and to reduce the time to market, as will be revealed in the following section.

There is a reversal of the global trend amongst Taiwanese firms, with online sales being undertaken more often than online purchases. This again indicates that Taiwanese firms are using the Internet as a defensive measure in response to the global trend towards digitization. Since international buyers are using the Internet to engage in trade, Taiwanese firms have to accommodate them by making their products available online; however, they are not taking the initiative, in terms of purchasing online as an aggressive business strategy.

The uniqueness of Taiwanese firms' use of the Internet for online sales is revealed in Table 5. In general, Taiwanese firms use Internet more for accessing new markets or replacing traditional channels, compared to the worldwide average. The contrast is especially sharp in

the manufacturing sector, where manufacturing firms use online sales either to address new markets or to replace traditional marketing channels; in fact, 68.8 percent of the sample firms were using online sales for that purpose. A further 22.9 percent were conducting online sales in order to compete with traditional channels, leaving only 8.4 percent of these firms using the Internet to address traditional channels, for example, using the Internet to enhance services in the traditional markets; in comparison, 38.8 percent of manufacturers in the overall sample use the Internet for this very purpose. This clearly indicates that broadening the marketing base is the primary purpose of the online sales offered by Taiwanese manufacturers.

Table 5 Internet usage for product sales, by sector (percent)

	Overall		Manufacturing		Retail/wholesale		Finance	
	Taiwan	Worldwide	Taiwan	Worldwide	Taiwan	Worldwide	Taiwan	Worldwide
Accessing new markets only	25.2	15.3	29.9	23.2	32.9	12.2	1.2	12.6
Accessing traditional channels only	34.2	44.1	8.4	38.8	49.7	47.8	52.2	33.4
Competing with traditional channels	19.6	27.4	22.9	25.7	17.2	26.2	18.1	42.3
Replacing traditional channels	21.0	13.2	38.9	12.2	0.2	13.8	28.5	11.8

Source: GEC Survey, CRITO, University of California, Irvine.

Within the retail/wholesale sector, Taiwanese firms also emphasized new markets more than their global counterparts; 32.9 percent of Taiwanese firms concentrated on this area in comparison to only 12.2 percent in the rest of the world. In the finance sector, Taiwanese firms demonstrate a contrasting application of the Internet, using online sales primarily to address traditional channels, even more so than their counterparts in the rest of the world.

Diffusion of the E-Commerce Industry

Taiwan's e-commerce industry began with Internet service providers (ISPs), with the state-owned telephone company, Chung-Hua Telecom, establishing the first ISP, Hinet, offering bandwidth to both business and household consumers through dial-up connections. A spin-off from the state-owned research organization, the Institute of Information Industry,

soon joined the market by establishing an ISP known as Seednet. Prior to the liberalization of the telecommunications market, Seednet was only able to provide services by leasing bandwidth from Chung-Hua Telecom.

A few pioneer entry portals joined the industry around 1994; amongst these, Yam was established as a non-profit organization, with the endorsement of the Ministry of Education, to provide a search engine for the academic community. This also provided links to universities and public libraries around the island. Being a hugely successful endeavor, Yam was later converted into a private company. The first private entry portal was Kimo, which developed a search engine to link to Taiwan-based websites. Like the portals in the advanced countries, Kimo derived its revenue mainly from advertisements. Kimo was acquired by Yahoo of the US in 2000 and became Yahoo.Kimo. Today, it stands firmly as Taiwan's largest entry portal.

Another e-commerce company, PC Home, also started out as an entry portal, but later transformed itself into a B2C company. PC Home started its e-business with a magazine subscription service, a typical intangible product sold online, and now claims it to be the largest B2C company in Taiwan. However, PC Home's current major business lines are computer-related products, although it also offers an electronic newspaper and a broad range of cosmetics online. Modeled on Amazon of the US, PC Home set out to become Taiwan's comprehensive electronic store, and today it offers more than 2,500 products online, divided into 60 shopping malls, with monthly sales revenue of around NT\$30-34 million (about US\$1 million). The company expects that its monthly sales will reach around NT\$100 million (about US\$3 million) in 2003.² However, unlike Amazon, which delivers its own products, PC Home has stuck by its strategy of offering products without delivery service; vendors are required to deliver the products.

Internet-related services, including data centers, web hosting, web construction and web application, have so far seen only mild growth in Taiwan; however, in 2001, the market value of such services was NT\$35.9 billion (approximately \$1 billion), growth of 14.3 percent over the previous year. The market value is expected to grow by 20.7 percent in 2002 and reach NT\$43.3 billion. In sharp contrast to the global trend, where the Internet service industry is three times the size of the Internet-application software industry, in Taiwan the former is smaller than the latter (Chou, 2002).

The slow development of Taiwan's Internet service industry is largely attributable to the

² Details obtained from a personal interview that took place on 26 September 2002.

reluctance of Taiwanese enterprises to contract out their web-related activities, as Taiwanese firms are traditionally unwilling to pay for services. According to government statistics, only 20.2 percent of private enterprises engage in such outsourcing activities, with the percentage being even lower in state-owned enterprises and public institutions (Chou, 2002). Another reason for the slow development of Internet service industry is the shortage of skills as Taiwan's web-service specialists concentrate in just a few locations, particularly in the Hsinchu Science-based Park. These specialists work directly for IT companies and prefer to develop and maintain their own websites within the companies. Thus, the web-service industry lacks the expertise to prosper.

Most e-commerce companies are locally developed and are small by international standards, but there is a clear indication that the market will become increasingly concentrated over time. For example, PC Home has dominated the IT products market, ezTravel dominates the travel service market and Book.com has a clearly dominant position with regard to book sales. However, the market remains segmented, with little apparent integration across product lines, and foreign e-commerce companies have entered into the local market mainly through acquisitions. One notable case, already mentioned, is the acquisition of Kimo by Yahoo. The US-based e-Bay also acquired a local C2C company as a means of entering the Taiwan market. This again suggests that consumer-oriented e-commerce is mainly a local phenomenon.

Most e-commerce applications were transplanted from the US, with sales of travel services, music, IT products and books being the mainstream products currently available online. One local innovation has been an online fortune-telling service. Taiwanese people will often seek local fortunetellers to provide them with assurances when they find themselves in a state of confusion. Using the Internet they can easily seek a 'second opinion' at a cost that is also cheaper than real-time fortune-telling. The imitation of online games, originally invented in Korea and Japan, is now widespread, and thanks to its solid IT technology and rich cultural tradition from which stories for use in these games can be developed, Taiwan now has a vibrant online gaming industry.

IMPACTS OF THE INTERNET AND E-COMMERCE

Efficiency

A firm may improve efficiency in various areas by using the Internet. The results on efficiency improvements assessed by the GEC survey are listed in Table 6. The numbers in the table

represent the percentages of the sample firms which considered the relevant impact to be ‘a great deal’ or next to ‘a great deal’ in the 5-point Likert scale.

Table 6 Impacts of the Internet, by sector (percent)

	Manufacturing		Retail/wholesale		Finance	
	Taiwan	Worldwide	Taiwan	Worldwide	Taiwan	Worldwide
More efficient internal processes	48.4	37.5	42.4	32.2	26.9	33.8
Increase in staff productivity levels	23.4	25.9	30.9	27.6	25.3	29.6
Improved customer services	33.8	40.8	49.9	31.1	41.5	39.7
Procurement cost decreased	-	23.5	-	15.2	-	13.8
Reduction in inventory costs	36.8	16.0	20.2	13.1	8.7	12.8
Improved coordination with suppliers	18.0	32.7	34.5	28.9	1.8	25.2
Sales increased	28.1	18.8	26.9	21.5	17.0	19.5
Sales area widened	44.0	33.7	26.9	30.3	33.4	30.8
International sales increased	35.5	24.0	35.8	18.5	16.4	9.1
Competitive position improved	33.9	34.1	42.5	27.5	27.3	30.9

Note: Numbers are percentages of sample firms that consider the impacts to be ‘a great deal’ or next to ‘a great deal’ (5 and 4 in the Likert scale).

Source: GEC, *Source:* GEC Survey, CRITO, University of California, Irvine.

It is clear that the major impacts of the Internet most widely recognized by the sample firms were: enhanced internal processing efficiency, improvement in customer services, and widened sales area. Of the three sectors, the retail/wholesale sector felt that they had experienced the greatest improvements in customer services, followed by the finance sector, and then the manufacturing sector. In addition to improvements in customer services, it is evident that improvements in internal process efficiency were also considered important, particularly in the manufacturing sector, where 48.4 percent of correspondents felt the impact to be significant or very significant, followed by the retail/wholesale sector, and then the finance sector. The manufacturing sector is also most impacted by the widening of sales area, as 44 percent of respondents felt the impact to be significant or very significant.

Reduction of inventory costs was most clearly felt by the manufacturing sector. This sector, however, was not impressed by the enhancement of staff productivity or improvements in coordinating their activities with relevant suppliers. In short, Taiwanese manufacturers considered that the impacts of the Internet were felt mainly in the processing efficiency,

improvements in customer services and inventory control, a perspective that reflects their major role as subcontractors for international buyers. These manufacturers have not yet advanced to those areas in which the Internet can be used as a means of improving staff productivity or coordinating activities with suppliers. Compared to the worldwide sample, Taiwanese manufacturers felt more impact by the Internet in the areas of internal processing efficiency, reduction of inventory cost, widening sales area, and increasing sales revenue. Taiwanese retailers and wholesalers felt more impact in the areas of internal processing efficiency, customer service, international sales and competitive position. In contrast, Taiwan's financial institutions generally felt less impact from the Internet compared to the sample average.

Clearly, the perceived impacts of the Internet are quite uneven across the different sectors. Manufacturers use the Internet mainly to keep abreast of customer demand, coordinating their internal processes so as to react to customer needs in a much more prompt and flexible manner. Retailers use the Internet both to reach new customers, and to better serve their existing customers with product information and after-sales services. In the manufacturing sector, it appears that savings on production and inventory costs are mainly achieved by international buyers, whereas in the retail and banking industries, the major beneficiaries appear to be consumers.

In most cases, it is the large firms rather than the small firms, which feel the greater impacts of the Internet. This can be seen from Table 7, where large firms indicate that they felt more impacts of the Internet than small firms, except in sales increase. As the benefits of the Internet are mainly derived from rapid information processing, large firms can take advantage of new technologies to increase the speed of their information processing. In contrast, small firms usually process information manually, with informal routines and reliance upon human judgment in decision making, leaving little room for systemic gathering and processing of information. The large discrepancy between a large and small establishment is observed in the area of coordination, with suppliers and customers suggesting the large establishment's superior capability in information management.

Table 7 Impacts of the Internet, by size (percent)

	Total	Large Establishment	Small Establishment
More efficient internal processes	42.5	48.9	42.2
Increase in staff productivity levels	27.9	30.4	27.8

Improved customer services	43.9	57.4	43.4
Procurement cost decreased	-	-	-
Reduction in inventory costs	24.1	32.6	23.8
Improved coordination with suppliers	25.6	43.6	24.8
Sales increased	26.1	21.5	26.3
Sales area widened	33.0	38.6	32.7
International sales increased	33.4	41.3	33.1
Competitive position improved	38.0	32.6	23.8

Note: Numbers are percentages of sample firms that consider the impacts to be ‘a great deal’ or next to ‘a great deal’ (5 and 4 in the Likert scale).

Source: GEC Survey, CRITO, University of California, Irvine.

Industry Structure

It seems that the Internet is driving industry towards vertical disintegration. In the case of the PC industry, brand marketers are increasingly concentrating on product design and marketing, while subcontractors take care of production, warehousing and after-sales service, sourcing the necessary major parts and components from specialized producers. Working with their main subcontractors on a global basis, the brand marketers are vertically disintegrated, yet globally integrated, and the Internet is clearly the backbone to such global integration. With the coordination of digital information networks, these brand marketers and their main subcontractors can coordinate their activities on a global scale.

It is apparent that the market power of the brand marketers has declined, whereas that of consumers has grown; thus, better customer service is the key to competing successfully, while low-cost production processes are a prerequisite. The use of foreign direct investment (FDI) by multinational firms in an effort to build up their production capacity so as to control the market, is no longer feasible. Instead they have to respond to consumer demand in consortium with external resources; thus, outsourcing becomes the norm in global marketing. Subcontractors, on the other hand, assume the role of producers and have to build up the capacity for utilizing global resources and servicing the global market.

A similar observation can be made on the semiconductor industry in which design houses are increasingly disintegrated from the foundry operations, which in turn, are increasingly concentrated in a few firms with geographically dispersed production sites. Integrated device

manufacturers (IDM) are increasing the proportions of outsourced components, while focusing on the key functions of design and marketing. Digital information network enables the foundry operators to participate in the “design-in” process, creating a technology synergy between designers and manufacturers.

In the case of the retail sector, the Internet has prompted strategic alliances across different industries. Retailers in particular have a strong incentive to partner with producers, distributors and shippers to form a competitive team, in order to compete for the new e-commerce business. Although it is retailers that assume the driver’s seat in the development of e-commerce, they will not succeed without the resources of the supply and distribution chains; therefore, B2C e-commerce provides the motive power for the ‘virtual’ integration of services. There is also a strong tendency for retailers to diversify, because once a trading platform is established, the marginal cost of diversification is small. A good example is PC Home, which started with magazine booking, later extended to computer and cosmetic products, and is now offering more than 2,500 products on line.

E-commerce is apparently inducing the separation of retailing activity into three distinctive parts: sales, commodity flow and money flow. Sales can be conducted successfully on the Internet if sufficient information can be gathered and trust can be established, whilst although disintegrated from the activity of sales, commodity flow and money flow have developed into separate industries. Economies of scale are apparent in the industry that handles commodity flows; therefore, there is an increasing degree of concentration in the shipping industry. Meanwhile, integrated services have become the norm in money flows. Banks, which handle money flow, are actively involved in transactions instead of passively financing transactions at the request of traders.

Competition

In the Internet age, production is increasingly being disintegrated, but scope for the horizontal division of labor seems to have been squeezed. This is because information-processing capabilities allow a firm to enjoy economies of scope in terms of offering multiple products. Through disintegration, product differentiation can be achieved without sacrificing scale economies. The practice of ‘configuration to order’ (CTO) in the PC industry is a typical example of exploiting economies of scope, allowing little room for horizontal differentiation of the product between firms. Hence, so-called market niches become increasingly difficult to protect unless they are guarded by some proprietary knowledge. In the Internet age, even proprietary knowledge may, in fact, have to be shared with vertically disintegrated production

collaborators if firms are to be able to offer a competitive product in the market. This is particularly evident in the PC industry in which the market has been increasingly concentrated with all leading brand marketers offering a set of differentiated products. All brands seem similar although the consumers can configure their own products. Competition is determined by the speed to market rather than the characteristics of product, whereby speed is enabled by the digital information network. Such contraction of the scope for the horizontal division of labor makes market entry increasingly difficult for digitally-backward countries, and therefore, what we will observe in the future is an increasing concentration of the manufacturing of certain products within a few countries, organized by a few multinational firms.

Internet application will not only affect industry allocation between countries, but it will also affect the distribution of production between firms of different sizes. Large firms have an apparent advantage in processing information, if not in accessing and exchanging information, and therefore enjoy economies of scope more than small firms. This is because large firms are more able than small firms to invest in information capital and personnel. In traditional cases, transmission of information takes more time when firms are large. Due to the Internet age, information spreads spontaneously to all people having access to the Internet. We can therefore expect to see large firms accounting for an increasing share of industry output. This advantage of size is more apparent in those industries where innovations are rapidly changing the nature of products, and where the sharing of information is crucial to the organization of production.

Within any country, e-commerce will also affect the location of industries by regions. The available information infrastructure, such as telecommunications and Internet facilities, is an essential element of the ability of firms to access and exchange information. Hence, regional differences in the readiness of information infrastructure will affect the location of industry. The agglomeration effect is not diluted in the Internet economy, indeed, it may even be reinforced. For one thing, in vertically disintegrated production, the availability of shipping services, such as those provided by UPS or Federal Express, is essential to the movement of products in order to integrate the commodity chains across borders. The shipping service itself has an obvious agglomeration effect; therefore, we may also expect to see production being concentrated in certain locations within a given country.

With the increasing availability of information, its value will naturally decline. In the Internet economy, simply knowing something is not enough to secure a competitive edge; it is the ability to respond to an influx of new information much more rapidly than a competitor that will create a

competitive edge. This implies that the structure of the organization has to be flexible and nimble enough to respond to new information in order to excel in the Internet economy. The traditional hierarchical organization with centralized control is therefore faced with tremendous challenges as a result of the rewriting of the ‘rules of the game’. Alliance capitalism will become prevalent in the Internet economy with firms combining and recombining themselves to respond to ever-changing market needs. Given the superior capability to process information and the better leverage to mobilize partners, large firms will be at an advantageous position vis-à-vis small firms. Between alliance members, the constant exchange of information will be a major prerequisite, while the development of routine practices to efficiently process information will form the core strength of the alliance. The digital divide will make the difference whether or not a group of collaborative firms can act together as an efficient processor of information. This requires something beyond hard facilities such as electronic networks tying firms together, as the group needs to develop the capability of responding to new information quickly and effectively to overcome its competitors. This entails product design capability, manufacturing capacity and marketing channels. When these capabilities are successfully developed, which clearly takes time and money, the network itself will prevent entry by other firms, and thus become a foundation for competitive advantage. Although the working of the digital networks are usually based on standard products such as IP, XML, the partners are sharing intimate information, which imposes high costs on replacement. Networking, therefore, is a key word in the knowledge-based economy, with ICT technology serving as the backbone for networking.

In Table 8, we examine the exports of information products to the US market as a proxy for global production. It is clear that Asian countries are dominating exports of information products to the US market, with these countries having accounted for 77 percent of the information products imported from the rest of the world by the US in 1998, a commanding market share which, although declining slightly, remained robust in 1999 and 2000. Aside from the Asian countries, only Mexico has played a significant role in the exports of information products, largely attributable to the direct investment induced by NAFTA.

Table 8 Exports of information products¹ to the US, by country

	1998		1999		2000	
	Value	Share	Value	Share	Value	Share
	(US\$ million)	(percent)	(US\$ million)	(percent)	(US\$ million)	(percent)
China	5,159	7.3	7,216	9.1	10,015	11.4
Taiwan	9,402	13.3	9,474	11.9	10,439	11.9
ASEAN ²	23,524	33.2	24,329	30.5	24,079	27.3

Japan	13,163	18.6	13,625	17.1	14,437	16.4
Korea	3,371	4.8	5,410	6.8	7,717	8.8
Asia	54,619	77.0	60,054	75.3	66,687	75.7
Mexico	5,268	7.4	7,012	8.8	8,769	10.0
Others	11,070	15.6	12,659	15.9	12,614	14.3
Total	70,957	100.0	79,725	100.0	88,070	100.0

Notes:

- ¹ Information products refer to HS8471 and HS8473.
- ² ASEAN refers to Singapore, Thailand, Malaysia, the Philippines, Indonesia and Vietnam; Asia refers to Asian countries listed in the table.

Source: Calculated from US Trade Data Tape.

There has been some rotation of production sites within Asia in the 1990s mainly from the ASEAN countries and Taiwan, with China being the main benefactor. This rotation is largely a result of rising labor costs in the former group. Nevertheless, despite a high concentration of production in Asia, most Asian exports are the property of firms originating outside of Asia by way of contract manufacturing. With the exceptions of Japan and Korea, which have some major brand-name electronics firms, local firms in Asia own only a small fraction of their exports to the US. Within Asia, in addition to Korea and Japan, production has been concentrated in China, Taiwan and the ASEAN countries of Malaysia, Thailand and Singapore. Some very small contributions have also been made by countries such as Hong Kong and Indonesia. The barriers associated with information technology and networked production has proved almost insurmountable, making new entry to the industry virtually impossible.

CONCLUSIONS

The most important driver behind e-commerce in Taiwan appears to be international competitive pressure; this is especially evident in the manufacturing sector. Taiwanese manufacturing firms are prompted to make use of Internet-related technologies and applications because they realize that they need to adopt e-commerce in order to serve the global markets. E-commerce is more widely diffused in the manufacturing sector in Taiwan, compared to the retail/wholesale and banking sectors, which are more domestic-market oriented. The greatest lag in the diffusion of e-commerce is in the retail/wholesale sector because B2C e-commerce is conditioned by local factors and the high density of real-time retailers in Taiwan limits the scope of e-commerce development.

The primary motivating factor behind e-commerce adoption is to better serve customers, and the Internet allows firms in all sectors to improve the efficiency of their internal processes and to enhance staff productivity levels. Taiwan's manufacturing firms also use the Internet as a means of reducing their inventory costs. In comparison with manufacturing firms in other countries, Taiwanese firms are more concerned with improving forward linkages to their customers than improving backward linkages to their suppliers, demonstrating a reversal of the global trend. Clearly, Internet applications aimed at enhancing supply chain management are still very limited in Taiwan.

The purpose of many Taiwanese firms adoption of e-commerce is predominantly either to broaden their customer base by exploring new marketing channels, or to create competition for the traditional channels. This stands in sharp contrast to the adoption of e-commerce by global firms, which tend to use it mainly to improve the traditional marketing channels. This implies that greater destructive effects from e-commerce will be felt within Taiwan's industries than in the industries of other countries and that this will possibly be accompanied by increasing market concentration. Indeed, in recent years there has been some evidence of an increase in market concentration in the PC industry, in which Taiwanese firms generally serve as OEM contractors.

Concerns over security and privacy in online trading represent the most significant barrier to e-commerce diffusion; this is, however, no different from other countries in the survey. Nevertheless, the issues of security and privacy appear to be much more entrenched in Taiwan, perhaps because of cultural characteristics, since respect for privacy is not a traditional value, but also because of the severe lack of legal protections for online transactions. The costs of Internet access and website maintenance are also considered to be significant barriers, while consumer attitudes are revealed to be an important impediment to the diffusion of e-commerce, particularly within the banking sector.

E-commerce diffusion appears to have the effect of driving the manufacturing industry towards vertical disintegration, yet with global connection. Multinational firms are outsourcing an increasing proportion of their functions, but this outsourcing is being managed by just a few subcontractors offering comprehensive global services. These subcontractors are, in turn, linked to a large number of specialized suppliers. Thus, market power seems to be shifting away from the producer and more towards the consumer.

In sharp contrast to B2B e-commerce, B2C e-commerce appears to be a purely local phenomenon with local factors shaping the path of development. The experience of Taiwan shows that product

innovation is the key driver behind B2C e-commerce. Without product innovation, e-commerce will be limited to the trading of intangibles. Conventional trade methods have an advantage over e-commerce in trading tangibles because it offers the opportunity for inspection. The Taiwan experience is further described in the Appendix. The development of B2C e-commerce is severely hampered by inadequate logistics services. Nevertheless, with regard to overcoming the logistics bottlenecks for online trading in Taiwan, the combination of convenience stores and electronic shops has proven to be a winning formula. In general, therefore, the use of strategic alliances as a means of accessing various resources not available on the Internet seems an effective way of e-marketing.

Several policy implications can be drawn from this study. First of all, the most important policy issue that needs to be addressed in e-commerce development is the establishment of an effective legal framework under which the security of transactions and privacy of traders can be safeguarded. Secondly, market liberalization which will inevitably lead to competitive pricing with regard to both Internet access and website maintenance, will also prove useful in Taiwan's efforts to promote e-commerce. Market liberalization also has the side effect of inducing product innovations, which are critical to the development of the B2C industry. Thirdly, there are different forces driving B2B and B2C e-commerce, and therefore separate policies must be formulated to effectively facilitate these different types of trade. A country that lags behind in one area may well move ahead in the other area, given the right environment and policies. In particular, B2C e-commerce has little to do with international competitiveness and the degree of industrialization, and therefore presents a golden opportunity for industrially backward countries to leapfrog to a higher level of economic development.

REFERENCES

- Chen, Tain-Jy, 2001, "Globalization and E-Commerce: Growth and Impact in Taiwan," CRITO working paper.
- Chen, Tain-Jy, 2001, "Protecting Network Positions with E-Commerce," forthcoming in *The Information System*.
- Chen, Tain-Jy, 2002, *Transforming Digital Divides into Digital Opportunities*, Taipei, Chung-Hua Institution for Economic Research.
- Chou, Shu-Lin, 2002, "The Prospects of IT Software Market and Applications by Enterprises in Taiwan," report by the Institute of Information Industry, Market Intelligence Center, (December).
- Donald Hicks and Steven Nivin, 2000, "Beyond Globalization: Localized Returns to IT Infrastructure Investments," *Regional Studies*, 34(2), 115-27.
- Gibbs, Jennifer, Kenneth Kraemer, and Jason Dedrick, 2002, "Environment and Policy Factors Shaping Global E-Commerce Diffusion: A Cross-Country Comparison," CRITO working paper.
- Ho, Chi-Yu, "E-Commerce in 7-Eleven: An Interview with President Chung-jen Hsu," *Business Next*, December 15, 2000, pp.54-55.
- Institute of Information Industry, 2002, *Digitization, E-Commerce and E-Security*, Taipei: III.
- Kraemer, Kenneth, Jason Dedrick and Debora Dunkle, 2002, "E-Commerce in the United States: Leaders or One of the Pack," CRITO working paper.
- Leamer, Edward and Michael Storper, 2001, "The Economic Geography of Internet Age," *Journal of International Business Studies*, 32(4), 641-665.
- UNCTAD, 2001, *UNCTAD E-Commerce and Development Report 2001*, New York: UNCTAD.

APPENDIX

E-Commerce in Taiwan's Retail Industry

At the present time, global e-commerce accounts for only a small proportion of retail trading. Even in the US, the most IT-savvy country, e-commerce accounted for only 1.63 percent of the country's GNP in 2000, of which only a quarter was accounted for by B2C transactions. In Taiwan, B2C e-commerce accounts for only 0.4 percent of GDP, which is largely attributable to the prevalence of real-time retail stores and the lack of appropriate products.

Despite having only the briefest experience of e-commerce in Taiwan, there is a clear suggestion that it means more than just trading commodities or services in an electronic way. Successful e-commerce requires companies to innovate, delivering appropriate products or services which offer some real value, and which do not currently exist in conventional trading. This implies that innovation is a prerequisite to successful e-marketing. The bursting of the 'dotcom bubble' suggests that simply putting 'old economy' products onto the web does not make good business sense, and it will take real innovation to transform 'old economy' products into 'new economy' ones. A good example is Dell Computers, whose success has come about not because it sells computers via its website, but because it sells them according to the demands of its customers. This represents a new kind of product, rather than a new kind of marketing, which will ultimately prove to be the real value underpinning e-commerce. A typical innovation in e-commerce is therefore the ability to offer personalized products, and this is exactly what Dell Computer offers.

Travel services have become popular e-commerce business because the Internet allows a travel agent to offer individual travel packages. This is extremely difficult to achieve via conventional trading because the transaction costs involved in offering personal packages are too high; however, with the rapid information flows carried by the Internet, individualized packaging of travel products becomes perfectly feasible. Consumers can choose their own route, their own transportation means and their own accommodations. Thus, the costs of individual travel packages are no more expensive than the mass products offered in conventional trading because the Internet substantially reduces transaction costs.

The second mode of product innovation in e-commerce is the ability to bring local products from remote areas onto the Internet, thus allowing consumers to purchase local specialties

from afar. The Internet enables the collation of a large volume of sales from consumers in thinly populated areas for these niche products, with modern shipping arrangements facilitating the delivery of these products to consumers in good condition.

A third form of product innovation is the ability to offer interactive products. One unique characteristic of the Internet is interaction; thus a product that embodies the interactive nature of the Internet is clearly unmatched in conventional trading. Online games are a good example of such innovation. Consumers can not only enjoy playing games online with someone else, but can also offer their own products by creating characters within the game.

Because innovations are often location-specific, B2C e-commerce is also likely to be a local phenomenon, and because it is a local phenomenon, the differences in industry infrastructures and cultures between countries may give rise to different paths of development. There are, however, certain elements that are indispensable to the development of B2C e-commerce, the first of which is the digital infrastructure. Consumers need access to the Internet and providers need a secure server to conduct online trading. The trading environment itself, which includes online security and adequate legal protections for consumers, is also an important facilitator of B2C e-commerce. Without the establishment of the basic infrastructure, and a supportive environment, B2C e-commerce cannot take off. Fortunately, since B2C e-commerce does appear to be a local phenomenon, the digital divide does not create such a great risk with regard to the foreign dominance of online trading. Any country lacking the infrastructure for B2C e-commerce presents a barrier to online trading to both domestic and foreign firms alike. We can probably make the analogy of a country without a seaport not having to worry about the penetration of foreign goods. Even without the protection of tariffs, cross-border e-commerce faces greater trade barriers than traditional trade because logistics also play a crucial role in Internet-based trading.

Logistics services (or e-logistics for short), which provide the necessary support for e-commerce, have also proven to be indispensable if e-commerce is to fulfill its potential. E-logistics includes the management of supply chains, inventories and delivery, and represents the major differences between e-commerce and conventional trading. In conventional trading, logistics services are segmented between the chain leading to the market and the chain leading to consumers. In e-commerce, however, there is no segmentation and no 'shock absorber' in between; thus, logistics have to respond directly to consumers. The existing e-logistic problems arise largely from the fact that e-commerce and the related logistics services have outgrown the development of new facilities. As a result of the reluctance of some sellers to engage in international

e-commerce because of the inability to solve the complex e-logistics problems, some e-retailers in the US, for example, have failed to fulfill orders during peak demand periods. E-logistics requires development of both hardware facilities and software applications, thus it is inevitable that such developments must be based on the foundations of conventional trading facilities rather than the creation of something completely new. E-logistics therefore also tends to be a local phenomenon, and it can prove extremely difficult for practices in one country to be transplanted intact to another country, indeed a serious interface problems arise when two e-logistics systems are to be combined and to function properly. In fact, even within a country, there is a general lack of integration between various applications used in different logistics functions. For example, there may be disparate documentation requirements in different transactions, such as government documents and commercial documents that need to be harmonized, and without such integration, economies of scale in logistics services such as shipping and distribution cannot be realized.

Given the underdevelopment of e-logistics, B2C e-commerce usually begins with products that can be handled by conventional logistics services, such as travel services, bookings and ticketing. These intangible products can be delivered by traditional means, such as surface mail, or may not need delivery at all. In almost every country, these kinds of products constitute an important proportion of B2C e-commerce. There are of course additional advantages to be gained from selling these products online; for example, in the case of bookings, the Internet updates the vacancy instantaneously and offers an interactive type of transaction to consumers.

Because of the weakness of e-logistics, e-commerce tends to emphasize the content of the product more than the embodiment of the product. The reason that content can play such an important role in Internet business is because it does not require delivery and it does not require physical contact with consumers for them to understand the quality of the product. Moreover, it can be easily recombined, reconfigured, or divided to suit the tastes of consumers. Books and music are also important items in e-commerce because what consumers obtain from these products are essentially the content embodied in the products. As long as content constitutes the major part of e-commerce, it is likely to remain culture-dominated and, therefore, will remain local. Nevertheless, just as in conventional trade, foreign products can sometimes penetrate cultural barriers; however, the penetration will not be based upon technological superiority, but instead, on cultural attractiveness. The Internet may in fact help the world to discover and appreciate many 'strong' cultures, despite the fact that many of the countries behind these cultures are technologically backward. In other words, just as

steamships facilitated trade with remote countries, digital technologies can facilitate culture-based trade.

Taiwan's electronic stores have found a way to overcome the difficulties of e-logistics; they borrow the logistic power of the conventional stores to offset their weakness. Conventional stores such as 7-Eleven (see the case study below) have huge numbers of nationwide outlets that can serve as product handover and payment settlement points. The conventional stores also handle the shipment and can offer an order-tracking service, which means that the electronic stores can then concentrate on product innovations and marketing. Such alliance makes e-commerce a complement to, rather than a substitute for, conventional retail trading.

As online trading reduces the transaction costs and the barriers to entry, small firms can compete with large firms based on the merits of their products rather than trying to compete on scale; indeed, e-commerce tends to place greater focus on the strength of the products, as opposed to the scale of production. If a small firm tried to match a large multinational enterprise by making a large investment in modern equipment for its website, it would probably never recover the costs. Scale matters in e-logistics (such as shipping and distribution) as well as in the platforms that facilitate trade; this is evident from the dominance of FedEx and UPS in e-commerce related shipping services in the US.

A similar tale can be told with regard to the Internet platform. According to a study by Jupiter Media Matrix (UNCTAD 2001), the companies which control the total time that Internet users in the US spend online went down from eleven in March 1999, to just four in March 2000. The number one ranked provider, AOL Time Warner Network, accounted for 32 percent of online time alone. This provides a strong suggestion of the existence of scale economies with regard to Internet service providers (ISPs). Although the distribution channels and platforms for trading have tended to become concentrated over time, the product variety offered online has continued to increase. Many small firms can now offer their products online, riding on existing distribution channels and trading platforms, despite their disadvantage of size. The Internet may even allow SMEs to pursue a new strategy aimed at building brand names or product images, ideas that were undreamed of in the old economy.

Indeed, the experience in Taiwan indicates that a strategic alliance between an e-commerce trading platform provider and commodity suppliers is the key to successful e-commerce. In order to realize economies of scale at the platform level, the platform operators have to work closely with a wide range of suppliers providing specialty products. Alliances are important

because the platform has to offer comprehensive coverage of the products in order to maintain the major advantage of Internet completeness, i.e., one-stop shopping. The marginal costs of product diversification for the platform provider are minimal.

Alliances are also important because the platform provider has to deliver the products faster than a conventional trader. Most of all, a platform provider does not maintain inventory, thus the management of inventory remains the responsibility of the supplier. Close coordination between the platform provider and the suppliers is critical to the success of e-commerce because time to market is the underlying strength of e-commerce. Therefore e-commerce essentially represents alliance capitalism.

A key facilitator of alliance capitalism is trust, that is, the trust of the consumer in the online traders. Since e-commerce operates without a store, consumers cannot physically view and touch the products, and traders have no effective means of demonstrating their commitment to the business. Even large traders like Amazon are considered to be fragile. In order to build up consumer confidence, two things seem to be important, the trader's ability to choose valuable products and bring them online, and the brand name of the product itself. Therefore, brand name products have an advantage over non-branded products in online trading. At the present time, the lack of trust remains a major drawback to B2C trade with concern over security and privacy being the major obstacle to the expansion of such trade.

Case Study: 7-Eleven

(The following are quotations from an interview with Chung-jen Hsu, President of 7-Eleven, reported in *Business Next*, December 15, 2000, pp.54-55, author Chi-yu Ho)

President of 7-Eleven: "When I saw the Internet boom, I did not rush to join the bandwagon, for I was not sure what we could do. I was contemplating what we could do. We are not inventors, eager to jump into unknown territories. We discover our roles from real life. We started with the payment collection service for utilities companies (the power company and the telephone companies). Before we did this, we had thought that most people paid their utility bills by bank transfers. But in fact, 40 percent of consumers paid these bills in person at the post office or bank, with cash. We thought we could offer a service to compete with the post office or banks. From the experience of the payment collection service, we began to realize that the key to e-commerce is sellers knowing that they will get paid and customers knowing they can pay to a trustworthy person. Incidentally, one electronic store came to us to propose a collaboration scheme, we concurred, and the result surprised both of us. Through 7-Eleven, the sales of the store increased more than 50 percent. We started to ponder what consumers

really need in e-commerce and to design our products accordingly. Whatever we do, we have to keep in mind that our resources are limited and we need a clear-cut objective before we take actions....The Internet is nothing but a marketing tool, through which we collect information and offer services according to the needs of consumers. To succeed in e-commerce, we need to know first where customers are, and what they want”.

(The following extract is from our own interview, which took place on May 31, 2002)

President of 7-Eleven: “We started our online shopping business in February 2000. We first worked together with Music Global Village, an online shop selling music products, mainly CDs. In choosing the partner, we also talked to a competitor of Music Global Village, by the name of Hua-Chung, but eventually chose the former because the latter had signed with our rival firm, Family Mart Consortium. We provide a service whereby consumers will know when the products they have purchased will arrive at the store that they have designated. 7-Eleven has over 3,000 stores throughout the country, and consumers can designate any store for product delivery from an electronic map that we provide online. To make online trading successful, we need to take care of the front-end as well as the rear-end logistics. The front-end logistics refers to the service to consumers, including confirmation of the order, providing information about the progress of the order, notification about the arrival of the products, and urging the customer to pick up the products if they are left sitting in the stores for over a certain period of time. The rear-end logistics refers to product delivery and payment collection. We had no problem with the rear-end logistics because of our established system in serving the island-wide convenience stores. We had more problems with the front-end logistics because this required intimate coordination with our partners. For example, we had problems handling partial delivery (e.g., delivering some of the CDs ordered while waiting for the rest to be located) although this seems to be more convenient for consumers. Nevertheless, our first strike with Music Global Village was successful, albeit slow: about 700 transactions took place in the first month after the launch of the service.

After gaining some experience, we started working with our second partner, Pokelai bookstore. This store is more established in e-commerce, so the volume of transactions was already 2,000 cases in the first month of our cooperative venture. Since then the value of trade for Pokelai has increased three-fold up until today, and we have therefore proved ourselves to be a valuable partner.

We then gradually increased our partners, and the total number of shops serviced by us today exceeds 60. They are separated into 7 categories: music and books, technology (3Cs), beauty and

health, travel, tickets, life, and local specialties. Initially, we provide a portal to link them together. Of course, this requires tremendous effort on the digital system, because each online shop has its own operating system. For example, the code numbers they use for the order number may differ, some have seven digits, and some have nine. We have to convert them into one single 'shipping number' such that our delivery system can handle them at the same time, but the conversion must be traceable to the consumers as they only know the order number given by the e-shop. We also need to bring our partners online quickly even if they have very limited capacity for e-commerce (both hardware and knowledge). What we are looking for in an alliance is good products, not e-commerce capability. To help those shop owners with inadequate e-commerce capabilities, we formed strategic alliances with Wanchi Weishin, an application service provider (ASP), and Yuanchi (part of the Acer group) that is an Internet data center (IDC), to provide the necessary technical services. The ASP provides software and consulting services on the establishment of the website and the IDC maintains the server for our collaborative shops. This makes opening an e-shop easy. You only have to pay NT\$120,000 a month, the ASP and IDC will be provided through us and the shop owner can rest easy. Our own portal system was developed by Microsoft (Taiwan).

There are three kinds of service that we offer to our partners. The first is 'product delivery and payment collection', the second is 'payment collection only', and the third is 'product delivery only'; the first type dominates the other two. The 'payment collection only' service applies to those cases where it is difficult for us to make the delivery, for example, fortune telling. Consumers intending to purchase fortune telling services download a payment bar-code from the Internet and come to our convenience stores to pay for it, they can then obtain the service by computer just by submitting the bar-code. Our function is nothing but a payment window, in just the same way as we provide services for the utility companies. The 'delivery service only' applies to those cases where consumers prefer to pay with a credit card or the shops wish to collect the payment before making the delivery; travel services are a typical example. Consumers believe that paying by credit card gets extra insurance coverage whilst the travel agencies feel that issuing a ticket without prior payment is a risky business.

Our business grew quickly as more and more partner shops were brought online. By December 2000, the number of transactions had exceeded 20,000 per month. With the help of Microsoft, we developed a Biztalk system under the XML environment. The system allowed us to connect with our partner shops within 5 to 15 days, drastically reducing the 1-2 month hook-up time of the previous situation. Moreover, the Biztalk system allowed all data to be concentrated in one place and handled collectively, which improved the efficiency of data

handling. Consumers are able to e-check their orders with the numbers issued by our collaborative shops. Delivery can be made partially, improving the time to consumers and reducing the inventory sitting in the shops. By August 2001, the application service provider (ASP) was brought into the system, allowing our stores to get online easier than before.

With Biztalk, we were able to launch some 'event' products, which have proven to be outside the parameters of conventional retail stores. Event products refer to those products that are sold on a single occasion; for example, flowers for Mother's Day, or Chinese dumplings for the dragon boat festival. Our advantages are the ability to reach a vast range of consumers and the fact that products ordered can be picked up at our stores within a specific period of time, for example, two days prior to Mother's Day. In this case, suppliers of the products can perform something like 'direct sales' without owning a store or salespeople, since there is no point in owning a store or hiring salespeople for products that are only sold once in a while.

Our first case was the launch of XP Windows's software by Microsoft. We made the product available for order on the Internet before the official release of the product, and consumers were able to pick up their order on the first day of the market-offering. Later on, this business model was applied to other new product offerings, such as new music albums by famous singers and new novels by famous authors, which are particularly attractive to consumers eager to obtain the products early. For example, we offered the new edition of Harry Potter online and sold 40,000 copies on the first day of its release.

The virtual 'direct sale' concept was later extended to local specialties, such as the famous Wanran pig knuckles made in a small village, Wanran, in southern Taiwan. With the aid of online services, consumers all over the country could purchase this famous product without having to travel to this remote village. We have a good 'cool-line' shipping facility, which ensures the freshness of the product upon delivery.

As the number of collaborative shops increased, we began to change our service concept. We used to consider ourselves as offering a portal service, bringing together a variety of stores, but with each store operating independently. In this case, consumers who used our service would need to establish a separate account for each store they happened to shop at, and they might find it necessary to use different names and IDs in the different stores. We considered it useful to provide a 'passport' for consumers, allowing them to enter our stores with the same ID. This not only saves the trouble of creating a new account when you go shopping, but establishes a kind of 'club' membership whereby consumer information can be accumulated, which in turn, can be

used to facilitate services and to promote sales. A consumer who purchased a bunch of flowers on Mother's Day last year is a good target for flower promotions on Mother's Day this year. This not only benefits our collaborative stores, but also creates a tremendous asset for us. As a result of this 'passport' service, we have converted our website into an electronic shopping mall whereby consumers can come and engage in window shopping. We do promotions on the mall, with bargain products from time to time, and bonus programs to encourage shopping across the board.

What services do we offer our collaborative stores? The most valuable service is the payment mechanism. Most consumers in Taiwan are reluctant to pay for shopping online for fear that their data may be leaked and abused. Fake credit cards created from stolen information are so prevalent that it is hard to convince consumers that online payment is secure. Consumers feel comfortable paying at the neighborhood 7-Eleven stores when they pick up their products. The second thing that we offer our collaborative stores is shipping services, which are cheap and fast due to economies of scale. We charge our collaborative stores a fee based on the nature and the value of products, regardless of the shipment distance. This simplifies the transaction because the stores do not have to calculate the distance to the consumer and adjust the selling price accordingly. Our collaborative stores only have to ship their products to our distribution center in Shulin in the suburbs of Taipei, with proper packing and labeling. Once the products reach our distribution center, we notify the customer of the expected arrival time of the product. The third service we offer our collaborative stores is a 'branding' service; being a collaborative member of 7-Eleven upgrades the image of the vendor's products because we ensure that only quality products are sold on our website. Our Group President, Ching-yuan Kao, is especially concerned with the integrity of the store owners and always makes sure the business conducted through 7-Eleven is fair. As a result of their alliance with us, most of our collaborative stores tend to increase their sales several times over, and transactions through us usually account for more than 50 percent of their total turnover. We believe that because of the competitiveness of our shipping service, our services will continue to be needed even if the online security problem in Taiwan is resolved and people begin to feel comfortable with paying online.

Given the nature of the services that we offer our collaborative stores, the products we handle tend to be medium-priced. High-value products, which often require a high degree of personal involvement, are not suitable for online shopping, while the shipping costs for low-value products are too high to justify such a trading mode. Therefore, only medium-priced products are suitable. The average transaction value on our website is NT\$400 and the most popular

products are books and cosmetics.

As to the consumers, we also offer several valuable services. First of all, we offer them a tracking service for the products that they have ordered online. Through our e-checking facility, consumers can check on the status of the product at any time. We send consumers messages by e-mail at each transition point. Consumers first get a confirmation of the order, which contains the order number for e-checking purpose. They will then get a pre-shipment notification when the products arrive at our shipping center. A third notice will follow when the products reach the stores designated by the consumers. A fourth notice will come if the products sit in the stores for more than a specified period of time. There may be further notices if the products require after-sales services; consumers can therefore rest easy after they have ordered a product.

The second service we offer consumers is the ability to pick up their products at any time. Unlike regular delivery services, by courier or post office, consumers do not have to wait at home for delivery. Given today's work format, most people stay in their workplace during the daytime, but there is no postal service available during the night. With our service, consumers can come to our store at any time (we open 24 hours) to pick up their products, and they can designate any store for such a service, either a store close to their home or one close to their workplace.

The third service we offer consumers is confidence in the products. Consumers can see the package before they pay. Although we cannot allow consumers to unpack the products (to avoid confusion as regards responsibilities), they can at least see the physical existence of the products before paying. If they are unsatisfied with the products, they unfortunately have to go through the returns policy of the respective stores in order to return the product. Although we tried to offer our collaborative stores a product returns service at the store sites, most of them declined. Due to consumer habits in this country, the e-shops prefer a policy that guarantees the opportunity to return the products, but there is also some cost involved. They fear that if it is so easy to return the products through the convenience stores, this may create a moral hazard problem: consumers could order with the ability to renege at almost no cost, because they do not have to pay for the product in advance. There are currently around 2 percent of cases where orders come into the stores, but consumers fail to show up to pick up their order.

Another service we offer consumers is privacy. If you purchase something online, perhaps as a gift, and have it delivered to your home, the person for whom the gift is intended may become aware of it. In contrast, if you purchase something and pick it up at our store site, you can

always avoid such inconvenience.

Because of the nature of the products and the services that we offer consumers, most shoppers on our website are young people aged 25-35, who are also the mainstay of Taiwan's Internet population. There is no gender gap, as male and female shoppers are about equal in number. Our store in Kinmou does the best business as such services are attractive to consumers in remote areas. For example, books sell very well in Kinmou. Other than Kinmou, stores in the Taipei Metropolitan area are most active because Taipei has the largest Internet population. Internet shoppers differ from real-time shoppers in that they are mostly purpose shoppers, i.e., they have something in mind before they turn on the computer to look for it. Internet shopping is attractive because they can shop at anytime and the price may also be cheaper. In fact, most Internet shoppers shop during working hours. Internet shopping is superior to mail order because the latter is limited by the scope of choice as hard-copy catalogues can only contain a limited number of products.

What impact does our online business have on real-time stores? We feel that the online operations are complements to, rather than substitutes for, actual stores. For example, we sell books at our real-time stores, but the choice is limited because of space constraints. With Pokelai, consumers have access to tens of thousands of books. The same is true for music CDs. We carry a few hot items in the stores and the rest can be purchased through the Internet. In the future, we may even install a broadband machine in the store so that our customers can access the Internet right there and, for example, see the availability of the seating in a forthcoming concert before they place an order. The actual stores offer local convenience while the virtual stores offer flexibility for purposeful shoppers. If e-commerce has any impact on actual stores, it will probably fall upon the supermarkets. But for the time being, the amount of transactions is small, and the scope of the products is too limited to cause a serious threat to the supermarkets.

Aside from the potential conflict with the large-scale supermarkets, e-commerce may turn out to be a major ally for SMEs. Some SMEs have very good products but do not have a sales channel, neither do they have the capacity to engage in advertising. Some of these SMEs came to our convenience stores in the past and asked us to stock their products for a trial sale; however, given the 3,000 stores that we have across the island, the amount of products they would have to put on the stack just for a trial sale would be beyond their capacity for risk absorption. A failure could even bring down the company. With e-commerce, they do not have to risk a large amount of product offerings. Instead, they can promote their products on our

website, the cost of which is relatively low, and produce the appropriate number of goods according to the consumer response; there is no need for inventory. We have several successful cases of start-up companies offering innovative products. For example, a cosmetics company which started with three people launched its products on our website. Within three months, the sales reached NT\$800,000-NT\$900,000, and the company now employs around twenty people.

Last month, the number of transactions on our website totaled about 330,000. This represents rapid growth from the 2,000 cases when we first started out. In retrospect, a big boost came from the development of our Biztalk system, which enables e-checking, easy hook-up with the collaborative shops and, moreover, customer resource management (CRM). The infrastructure is important because we want to allow for multiple access to various e-shops in order to realize economies of scale. We also made the correct decision not to offer our own products on the website, providing instead, only services. In comparison, the experience of Japan's 7-Eleven (e-shop) has not been as successful because it offers its own products that may compete with the collaborative stores.

Of course, we also encountered difficulties in the process, but most often, the problems came because of human error. We have 3,000 stores which run 24-hours a day, and the turnover rate of storekeepers is very high. Many storekeepers are part-time workers, such as students, who stay in the job for an average of only three months. Training of a labor force with such a high turnover rate is quite difficult and human error is inevitable. Another problem is that our stores are constantly on the move, some stores closing, others undergoing renovation. We update the information quickly, but there is always a time lag. A customer may place an order three days before, when the store was operating normally, but may then find that the store is undergoing renovation at the time when the products are ready for shipment. We then have to notify and consult with the customer about an alternative delivery point.”

Discussion

The fundamental concept of 7-Eleven's e-commerce is a combination of virtual stores combined with its actual stores. 7-Eleven is already the island's largest retail chain store, occupying 47 percent of the convenience store market. The advantage it possesses is the widespread presence of stores around the country that offer a convenient point for consumer contact to facilitate delivery and payment settlement. This is aided by an efficient transport

system, which offers low-cost shipping. 7-Eleven chose to ally with various e-shops that provide the products, and to concentrate on its strength of handling post-transaction logistics, namely commodity flows and money flows. It established a portal such that all shops could be brought online with low entry costs. In the end, this will enable 7-Eleven to establish an electronic store complex, with each store being served by 3,000 actual stores island-wide. This implies a multiplication of virtual stores with actual stores, the power of which is clearly awesome.

The addition of the virtual stores to its retail chains means more customer visits to its stores, which of course, offers new opportunities for sales from its actual stores. In 2002, 7-Eleven started installing automatic teller machines (ATM) in its stores, in cooperation with some local banks, to further upgrade its payment service. This not only makes payment easier, but also again brings more consumers to the stores.

With an island-wide sales network that effectively combines real-time and online trade, 7-Eleven has access to timely and detailed consumer information. It knows what products sell well in what area, and probably to what kind of consumers. This information enhances its ability to choose the right products and may also be fed back to producers to help production decisions. 7-Eleven has even used this sales network for product innovation. For example, it recently held a sandwich innovation contest, which drew 471 competitors. The top three products selected were subsequently contracted by 7-Eleven for production and for sale in the stores island-wide.