

CASE STUDY OF SAMSUNG- TESCO, KOREA

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1. Introduction

1) Description of Retail Business in Korea

Retail business is emerging as one of the most promising businesses in Korea due to what Samsung-Tesco calls a ‘powershift’ from manufacturing to distribution. Indeed, it is especially true in Korea; while the retail business of U.S. and Japan took 32% of GDP on average, that of Korea’s took only 21% in year 2000. Samsung-Tesco conservatively forecasts that the average growth of retail business, between 2000 and 2005, would be 8.6%.

Currently, the ‘big five’—Homeplus (Samsung-Tesco), E-Mart, Carrefour, Magnet, Walmart—consists 52% of the market. As small retail businesses are increasingly being absorbed to big retailers, department store, and supermarket, the competition among the ‘big five’ is becoming fierce to take advantage of high growth market, which also possesses the strategic advantage of a spearhead for entering Chinese market.

2) This Case Study and the Timeframe

This case study describes the implementation of new economy paradigm, which took place during and after the merger of Samsung Corporation and Tesco PLC. Although the major target of the merger was not exactly on uptaking new economy paradigm, the merger process has played critical role in implementing new economy paradigm in Samsung-Tesco. The case study timeframe stretches from early 1994 to the present while many of the important issues in this case unfolded from 1997 to present. Information in this case was gathered through an interview and questionnaires along with direct observations.

3) Background

In March 1994, after separating out from Samsung group (*chaebol*), Samsung Corporation entered into retail business. There was little doubt that Samsung Corporation would be very competitive because of its well-recognized management skills and capital. However, when it opened its first three retail stores (Homeplus Taegu, Samsung Plaza Bundang, Samsung Plaza Seoul) in 1997, the financial crisis broke out. Plummeting consumer confidence and viciously high cost of financing inevitably placed Samsung Corporation into financial status of literally a step away from bankruptcy; accumulated loss during 1998 was KRW 249 billion (approximately US\$200 million)¹. To overcome this unprecedented difficulty, Samsung Corporation began to restructure its business and downsized the organization while searching

¹ Calculated in KRW 1,200 per US\$. It should be much higher if it was calculated by exchange rate of that time (Approximately KRW 1,800 per US\$).

for the breakthrough strategy. Recognizing that retail business is too attractive to give up, Samsung Corporation decided to seek for foreign investment².

At the same time, after successfully establishing its business in Thailand, Tesco PLC was also looking for partner that could provide strong local background as well as capability of creating synergy for Tesco's regional network. As the need of both parties met, Samsung-Tesco was established in May 1, 1999. Through the merger, and initial investment of US\$ 220 million from Tesco PLC, Samsung-Tesco was able to clear out all debts and rehire all of 1,137 workers who were laid off during 1998. Strategy and Planning Division of now Samsung-Tesco evaluates the merger a success for two reasons. First advantage was financial. The merger not only saved Samsung-Tesco from bankruptcy but also guaranteed Samsung-Tesco a subsequent investment of \$170 million (KRW200 billion) to dominate the market. Second advantage was access to the advanced management skills and IT technology to compete with other world class rivals such as Wal-mart, Carrefour, Costco, *etc.* <Table 1> shows visible improvements of Samsung-Tesco after the merger.

<Table 1> Trend of Sales Growth Rate and the Market Rank of Samsung-Tesco

	1999	2000	2001*
Sales	US\$363 million (KRW 435 billion)	US\$516 million (KRW619 billion)	US\$1.2 billion (KRW 1.4 trillion)
Growth Rate	-	42.3%	126.1%
Market Rank	5 th	4 th	3 rd **

* Estimated

** First and second rankers are E-Mart and Carrefour

While the 'catching up' of Samsung-Tesco since the merger in Korean retail market is impressive, these figures shown in <Table 1> are not the sole factor for increased attention that Samsung-Tesco receive from the media, the competitors, and the business analysts. In fact, Samsung-Tesco's critical success factor lied in its effective management of the new trend that influenced every industrial nations including Korea—the new economy paradigm.

2. New Economy Narratives

As it was shown in the case of U.S., new economy benefits cannot be fully exploited unless it is supported by infrastructures including human resources capabilities and organizational (socio-cultural) capacity. And it is obvious that, depending on the stages of the development, each recipient of new economy paradigm (business, civil society, government agency *etc.*) will have different degrees of impact and will show different reactions to the new economy paradigm.

Samsung-Tesco's situation was unique in that it had already had IT hardware prepared but it had to adopt global standard IT hardware as well as software (infrastructures such as readiness of workers to adopt new system and culture) for heightened competitiveness. If we

² Since the financial crisis of 1997, Korean government actively promoted foreign investments and deregulated related laws. It would have been much difficult or impossible if the regulation that existed before the financial crisis still existed.

define³ new economy paradigm narrowly and limit to just IT hardware, Samsung Corporation had already established its own IT system independently. The IT industry of Korea was quite competitive and the very nature of retail business required intensive IT system throughout its entire value chain. However, after the merger, the requirements on the system have expanded to cover global network, as well as future expansion of logistics system. Samsung Corporation's former system did not meet the requirements of global standards although it worked well on the domestic basis.

Samsung-Tesco faced dilemma of either just modifying the former system or changing the entire system to Lotus system that has been used in Thailand⁴. The Lotus system was more desirable for it was a global standard and flexible enough to take into account a rapid expansion; the former system was consistent with Korean currency, language, practices, and most importantly, people were used to it. The former system was operated in Windows system while the Lotus system was operated in DOS system⁵.

Samsung-Tesco decided to partly adopt Lotus system: for retail system, Samsung-Tesco fully adopted Lotus system, and for finance, Samsung-Tesco adopted Oracle financial. However, for personnel management and groupware, Samsung-Tesco decided to stay with the former system. The Lotus system was chosen for retail system—the backbone of the entire value chain in retail business—because of following reasons. First, the former system does not reflect characteristics of multiple stores network—the multiple stores network requires simplification, standardization, and specification of the system. This problem will inevitably be intensified as Samsung-Tesco expands its business. Second, it is clear that, in the near future, global supply chain system will be developed and it will require global standard that the former system is lacking of⁶. It is highly probable that future competitiveness of Samsung-Tesco will be built around its global network; one of Samsung-Tesco's tough competitor—Wal-mart—already introduced its global EDI system. Third and the most important reason was reliability of the Lotus system. Because the Lotus system has already proven its performance in practice, Samsung-Tesco did not have to risk reliability of the system in the situation where the competition is already intensifying.

The principle in adopting the Lotus system in Samsung-Tesco was glocalization (globalization + localization), which is one of the business motto introduced by Seung Han Lee, the CEO of Samsung-Tesco. Glocalization basically pursues, as far as possible, the global standard while recognizing that global standard is not the panacea and therefore business environment of Korea should also be respected. The transition process took three stages as shown in <Table 2>. Note that it took almost one year (10 months) to adopt new IT system.

³ In this case study we define new economy as economic model which any networked two-way information and data communication devices facilitate better decision making of the organization and lead to higher performance.

⁴ Samsung-Tesco has chosen the Lotus Thailand system because the Thai environment was most similar to that of Korea's among Tesco's global network.

⁵ It does not necessarily mean that DOS system is global standard.

⁶ Samsung-Tesco plans to increase global sourcing by 4% of total sales in 2002, 6% in 2003, 8% in 2004 and 11% in 2005

<Table 2> Stages of IT System Transition

Stages	Content
1. Survey '99.7- 12	<ul style="list-style-type: none"> • 30 managers from product/operation/accounting/IT were sent to Thailand to review the Lotus system. • Korean version of Lotus was established and Korean manual was developed.
2. Education '99.12-'00. 2	<ul style="list-style-type: none"> • 60 trainers were sent to Thailand to experience actual operation of the system
3. Adoption '00.1-5	<ul style="list-style-type: none"> • Change management project was launched to minimize the friction from the transition

Samsung-Tesco's case implies some insights for the nature of new economy paradigm. *First*, the merger enabled Samsung-Tesco to tap into networked information resources that Tesco PLC has developed around the global network. Samsung-Tesco, without taking risk of developing and testing IT system in the battlefield (competitive retail market of Korea), adopted global standard IT system along with related experiences and business know-hows that were developed in Thailand. It is consistent with the existing theory that drafting in behind the global technology leaders or becoming part of the global technology leaders can be more beneficial than starting from the scratch. *Second*, as international operability of the system gains its importance, so is the importance of localization. This paradoxical statement implies that, to garner the maximum network benefits, the one-way flow of information will not be enough. While pursuing global standard, there should be a continued supply (feedback) of local information to increase the network effect. If Thailand's experiences (which had similar environment to that of Korea's) were not accumulated in the knowledge pool of Tesco, Samsung-Tesco would not have benefited as much from the network. *Third* implication is the importance of infrastructure, especially the human resources infrastructure. Samsung-Tesco accredited that IT workforces who were trained in government institutions and hired by Samsung-Tesco have played an important role in adopting and adjusting the Lotus system to Korean environment. Samsung-Tesco was very satisfied with their skills and appreciated the effort made by the Korean government. However, as will be described later, Samsung-Tesco emphasized post-hiring education and corporate culture as more important aspect. Samsung-Tesco also noted that quality of non-IT workforces is important as well⁷. As the boundary of management has increased and routine works were done by IT system, the quality and impact of decision making by workers (IT and non-IT) became much more important than before.

3. New Economy and Policy

1) Macroeconomic Policy

Macroeconomic environment of Korea played a unique role in promoting new economy. The financial crisis of 1997 had both negative and positive impacts on Korea. Although the crisis led many Korean companies to go bankrupt, it also drove out many inefficient companies out

⁷ They asserted that, at least in retail business, there is no distinction between IT and non-IT because so many decision making processes are dependent on IT technology.

of business and forced the companies to be competitive to survive in harsh macroeconomic conditions. Had the macroeconomic conditions been favorable, Samsung Corporation would never have considered a merger with Tesco PLC and the result would not have been as good as now. Strategy and Planning department of Samsung-Tesco pointed out that while favorable macroeconomic condition is important and much more preferred, it is also the case that the unfavorable macroeconomic condition sometimes boosts restructuring and creates an environment for what Samsung-Tesco calls a 'step change'⁸. When the organization does not have capability of conducting 'creative destruction', unfavorable macroeconomic conditions could stimulate the innovation process, but it should not be (and cannot be) deliberately created for its risk is too big.

2) Services Infrastructures

Service infrastructures such as physical distribution network, communication network indicates national competitiveness and plays critical role in determining the success or failure of the businesses. Samsung-Tesco, while satisfied with the communication infrastructure of Korea, evaluates Korea's logistics network as insufficient. According to Samsung-Tesco, the ratio of logistics cost to sales was 12.9%, which is far behind that of U.S. (9.0%), Japan (6.4%), and Great Britain (4.7%). However, Samsung-Tesco commented that the Korean government's current effort⁹ to enhance logistics network in Korea will have positive effects and show improvement in the near future.

3) Business Environments

Despite the continuous deregulation efforts of the government after the financial crisis of 1997, there still is more room to be filled. Samsung-Tesco finds following problem with government regulations on business. Samsung-Tesco focuses on three core businesses: Homeplus Hypermarket, Homeplus Internet Shopping mall, Homeplus Retail Banking. In fact, this was basic strategy of Tesco's global business. While other two businesses were successfully launched, Homeplus Retail Banking was not permitted by the Korean government. However, Samsung-Tesco was optimistic about the financial liberalization of Korea and expects to launch Retail Banking unit in a near future¹⁰.

4) Human Resources Capability

According to Samsung-Tesco, human resources management has two different aspects. While universities and institutions play important role in supplying qualified human resources, the maintenance and improving of human resources should be facilitated by Samsung-Tesco (or other organizations such as government agency, private firms, etc). Samsung-Tesco emphasized its role in further developing human resources after hiring. The basic philosophy of its training programs such as English learning programs, computer classes, capability

⁸ A breakthrough, or innovative change as opposed to incremental change.

⁹ Currently there are six logistics centers in Korea. But it is expected to be twenty-nine by year 2002

¹⁰ The Korean government's hesitance was quite natural after facing severe financial crisis due to lack of supervision on financial sector.

developing programs were to establish glocalized corporate culture that unifies Tesco PLC and Samsung Corporation together.

Samsung-Tesco faced difficulties in 1999, right after the merger. The morale of the employees was quite low due to cultural difference caused by merger, language barriers, and communication difficulties. The major conflict was that employees perceived the new management process of Samsung-Tesco to be too rational and lacking humanity. To make reconciliation of the conflict between Tesco PLC's corporate culture and Samsung Corporation's, Shinbaration Task Forces was launched by the CEO, Seung Han Lee. Shinbaration is a concept that consist of 'Shinbaram' and rationality. Shinbaram is emotional reaction that allows people to achieve more than their limit. This very Korean culture is somewhat too emotional and lacks rationality, which Tesco PLC has been emphasizing in management. The object of Shinbaration Campaign was to encourage teamwork and create working environment where employees can surpass their limit while not letting it develops to cronyism.

While the Shinbaration Campaign is still on progress, Samsung-Tesco's personnel management team finds that there are some signs of two different business cultures getting balanced out. Personnel management team added that the next step is to develop a philosophy that binds two different cultures together.

What Samsung-Tesco emphasized in human resource capability development was well-balanced management of different cultures that cannot be evaluated as which one is good or bad. Samsung-Tesco's case implied that, in developing human resources capability under new economy paradigm, the cultural glocalization concept should be emphasized as a basis for functional skill training programs (e.g. English, Computer skills, *etc.*)

4. Summing-up and Looking Forward

To Samsung-Tesco, the new economy meant more than just adopting IT hardware. It is relatively easy to adopt just the new hardware and train employees the new skills that are required by new technology. The harder part is the balancing of different culture (in this case, British and Korean) to create glocalized culture of management. As new economy thrives on network and the network connects different regions and cultures, the balanced (globalized but also localized) mindset of the workers plays critical role in utilizing the benefits of global network.

Samsung-Tesco plans to anchor on Shinbaration Campaign until they could concretely define Samsung-Tesco culture (unique but conforms to global standard) because it is philosophy and culture, rather than functional adoption of new economy technology, that decides the success or failure in adopting new economy paradigm.

Although Samsung-Tesco recognizes current reform efforts of the government and benefited from it, there exists room for improvements. Samsung-Tesco recommended following suggestions. First, while the second stage foreign exchange liberalization act of 2001 allowed repatriation of proceeds if the management desires, Samsung-Tesco still feels that the process

was still too complicated. Second, public-private sector partnership in developing logistics network in Korea will be profitable for both parties. Third, to develop global supply chain, the customs clearance procedures should be enhanced to shorten the lead-time.

MINI-CASE STUDY: MALAYSIA*

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Short Overview of Client:

The client is a Malaysia-based, privately owned trading and distribution company involved in the import and export of industrial products. Owned and controlled by a what is commonly dubbed an ‘overseas Chinese family’, the firm has thirty employees and offices in three countries (Singapore, Hong Kong and Malaysia). The firm’s turnover is approximately US\$12.5 million per annum. Founded in 1945, the business was acquired by the present owners over 35 years ago.

‘New Economy’ Narrative:

By their own admission the client firm is conservatively run and extremely cautious. However it became clear in 1998 that the client could cut costs by using information technology (IT) especially vis-à-vis international communication. Initiating the move themselves they invested in the networking facilities in order to remain competitive.

There is no doubt that the reduced costs have been a direct benefit to the bottom line. Furthermore the accelerated operation times has reduced inventory costs. However the internet has not resulted in an expansion of either the customer or supplier base. The clients stressed that in the industrial supply business the element of personal relationship remains crucial: “we want to know who we’re dealing with. There has to be a ‘face to face’ meeting before we can proceed to business.” Clients were adamant that a good track record of service, reliability and a strong market reputation helped them maintain their competitive edge. They doubted that a web-site—without the personal touch—could help them.

Clients explained that in their business, customers often had very specific, customised orders and requests. For example a customer might order a semi-finished product such as brass rod. Even if the order volume is low, in the event of a hitch, clients were expected to visit the workplace and rectify the problem. Clients understood that by maintaining close ties and regular site-visits that they would be able to track customer preferences as well as head-off any future problems.

In the case of the brass rods, clients would be expected to examine the problem and make an immediate assessment of the damage and means of rectification. “We have to know our customers inside-out, the processes they use, the workers, their skill-level and the machinery in situ”. Having made the investment in time and effort they say ‘there is a lot of give and take in the business relationship: we work together’.

* This case study was edited at the request of the Government of Malaysia

Our clients—especially new accounts—refuse to negotiate over the internet. “Discussing terms over the telephone and via fax and email somehow undermines the legitimacy of the company and the perception of our seriousness. It’s just too impersonal. We are not paper-shufflers. We have to meet clients face-to-face to give them the comfort.” As a consequence clients were very skeptical of the likely success of B2B exchanges in their business.

New Economy and policy:

Since most of the new technology and software is imported and/or assembled with foreign inputs the pricing tends to follow the movement of the US\$. Exchange rate volatility can impact on whether or not clients chose to implement a new round of investment in technology. Of course, when as now industrial activity appears to be slowing, clients put off investments in new technology.

Services infrastructures, policy and environment:

Telephone lines within Malaysia are according to clients always congested and the Internet Service Providers (ISP) are insufficient. “When it fails, you’re dead”. They also voiced concerns about occasional fluctuations in electricity supply and the detrimental impact on stored data, saying “often we make non-electronic duplicates of data which is expensive and time-consuming”.

But clients were much more unhappy with what they saw as the software suppliers’ attempts to generate more sales by introducing software with only marginal increases in terms of efficiency and costs. As they say “there should be to be tax write-off provisions.” They were unhappy about the way the hardware and software suppliers are determined to gouge buyers. “We are not wealthy multinationals and yet we are expected to pay exorbitant costs to protect our data base. Large companies have entire teams manning their systems, we can’t afford that.”

Furthermore with the advent of email, clients have discovered that their “extremely expensive data” is also vulnerable to external viruses. “In the past faxes and telephone calls wouldn’t corrupt our data. This has meant a further duplication of effort as emails are often backed up by faxes This is a ‘dead cost’ in our eyes.” Clients felt that instead of spending the time ‘mining the data’ for value, valuable management time was devoted to monitoring the data systems and their protection from external corruption and viruses.

When asked about financial intermediaries and distribution, clients were of the view that efficiencies depended on the quality of management and supervision. “We are concerned about the calibre of the people inputting data and supervising the process.” Given the amount of information now made available through the internet, they were also worried about security provisions.

Micro business and labour environment including rule of law:

Clients felt that the regulatory environment created price controls. They doubted the openness of the markets, the transparency of price-setting mechanisms. {...} As far as clients were concerned there were, at least in late 1999 and early 2000 very high expectations about the internet and its ability to cut business costs. However, they have found that many apparent advantages have not been applicable in their service-driven business: “we still have to deal with our clients the old way, by calling them up and seeing them on site. That’s what they like and want.”

Clients felt that clearer overall policy management would assist them in their business. Improvements in physical infrastructure were important but often the soft-infrastructure had been neglected. They were not aware of any cyber laws but professed not to have followed the developments in this field in any way.

Human resource capability:

Clients felt that the best manpower (foreign-trained) was cherry-picked by the MNCs. “We are left with the second tier.” Moreover they were consider that there was a major difference between the skilled and unskilled and that the pool of IT-trained workers was not large enough: “there just aren’t enough people to go around.” As a result it was often difficult to explore new ways of doing business and evolving new products and services. Clients conceded that the government was investing time and energy in upgrading worker skills: but as they said in exasperation, “it’s still not enough. Though we do see a much more IT savvy younger generation of workers emerging.”

Clients also observed another new development that troubled them. The language on the net is a new challenge. “At first we thought is was a question of whether or not we’ll be using Bahasa Malaysia, Mandarin or English. However now we see the emergence of a new net-based language that uses abbreviations and icons. This is fine for people who are familiar with it. Most of our clients and the operational people on the factory line don’t have the time or experience to learn what these icons mean. They want solutions and answers not more confusion.”

Conclusion and Policy suggestions:

Clients were skeptical—especially after the deflation of the internet bubble of the value of new technologies—to their business. “We still have to service clients the old way.” Whilst they acknowledged they were cautious, they were relieved that they didn’t over invest in new software when everyone thought it was the thing to do: “that saved us a ton of money, since most of the software and hardware is obsolete within six months.” Clients considered education and human resource development as the key to improving the business environment.

MINI-CASE STUDY: PERU

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1. Short Overview of the Client

The Peruvian Institute for Electronic Commerce (IPCE in Spanish) is a unique non-profit organization based in Lima, Peru. IPCE's mission is to promote and to spread the knowledge on topics like electronic commerce (e-commerce) and e-business, counting with the commitment from the private sector as well as the Government. Besides, IPCE's contribution will improve the performance of local companies from using the latest technologies for being more competitive and recommending the use of both national and international best practices, under the appropriate legal framework.

Many companies and governmental agencies are associated to IPCE and take decisions through a representative Board of Directors. These companies are leaders in their respective businesses, mostly Information and Communication Technologies (ICTs), while the Government Agencies are the governmental institutions most compromised with the use and spread of ICT. With more than two years of existence, IPCE has positioned itself as an organization in charge of recollecting and analyzing the information regarding the growing e-commerce sector in the country, because there weren't any concrete statistics about the real situation of e-commerce in Peru. IPCE currently has 15 employees distributed on four areas: management, research and projects, communications and legal affairs.

2. "New Economy" Narrative

As an organization completely dedicated to promote and analyze the e-commerce and e-business industry in Peru, the new economy forces influence directly over this institute, since it was created precisely around these forces and the growth perspective they create. The Internet is IPCE's field of analysis and at the same time, it's IPCE's main tool to achieve its goals. The IPCE is an intensive user of ICTs, and owns a local computer network, a web site and all the necessary elements to allow a good performance in a new economy context. The IPCE publishes a daily e-commerce news bulletin (distributed via e-mail) and many industry-related market reports; in both, appropriate software is used to analyze, write and publish the outcomes. The IPCE, as an information generator, is an office software heavy user.

Since it's creation, it was considered absolutely imperative counting with the necessary infrastructure capable to offer IPCE's employees the necessary means to complete their information-generating labor. Companies and government agencies involved in IPCE's foundation decide to contribute with those elements according with their own possibilities, so the project could be carried out. Then, private companies, mostly from the ICT industry, gave the necessary hardware and software, while the government agencies contributed with their influence and the required contacts with multinational entities such as APEC. It was precisely

APEC who has given IPCE some international positioning, considering its already achieved goals related to ICT.

ICTs from the new economy have made possible for IPCE to create a unique labor in this country, such as the specific analysis of the Peruvian ICT, e-commerce and e-business industries, the organization of seminars and events regarding those themes, as well as conferences and forums, constituting some of IPCE's main income sources. Likewise, another of IPCE's main goals is to provide accurate information for the internal market as well as the international one, so they could have an exact idea of the actual situation of these sectors in Peru, generally relegated from international statistics.

As an example of actual IPCE research, it was determined that Business to Consumer (B2C) e-commerce in Peru generated approximately US\$10,9 millions on 2000. An even more interesting statistic is that almost 80% of this type of e-commerce was made by Peruvian citizens abroad; according to a report by the Inter-American Development Bank (IADB) the 1,5 million of Peruvians living abroad send back to their families in Peru approximately US\$800 millions each year. IPCE concluded that the main market segment to boost B2C e-commerce in Peru would be the ever-growing communities of Peruvians living abroad, who have discovered in e-commerce a way to securely send assorted products, specially groceries, for their relatives, by buying on Peruvian e-tailers and sending the products all over the country with relatively low prices.

Additionally, IPCE was able to determine, evaluate and analyze two new economy phenomena produced solely in Peru, including both of them high amounts of creativity and talent for making accessible some of the new economy benefits to the masses. These ideas are so good that their schemes have been imitated in other countries with similar technology and economic characteristics as Peru's. These two phenomena of approaching Internet and its benefits to the population sectors with lower incomes are the "public Internet rooms" ("cabinas públicas") and the "Internet prepaid credit cards". Both solutions have contributed a lot to boost the e-commerce development and Internet utilization across Peru.

Public Internet rooms are small Internet access areas open to the entire population. The business model is essentially a computer Internet access rent at extremely low prices (approximately US\$0.70 an hour), due to the ever-growing competition, in a small area for around 5 to 20 computers. This access phenomenon comes from 1995 and now there are around 1500 public Internet rooms across Peru, giving Internet access for the vast majority of the Peruvian Internet users, which are approximately 1 million people.

The other phenomenon is the Internet prepaid credit cards, which have turned to be the fastest growing and preferred payment method for those who can't afford or meet the requirements to get a credit card, mainly because of the high requirements established by the financial system. This is why most Peruvians were excluded from purchasing products over the web, whether from one of the approximately 50 Peruvian e-tailers or from another e-tailer around the world. Currently only half million Peruvians have a credit card. An Internet prepaid card is no more than an actual physically existing card or a virtual one, based on a credit card number that is related to a bank account, where the owner makes a deposit to "load" the card

enabling it to buy goods or services on the Internet. These cards have the support from the main credit card companies, and they work just like any international credit card, allowing the owner to buy on any e-tailer on the web. This way, those steep requirements are reduced, allowing many people to buy products on the Internet. Right now, there are three Internet prepaid credit cards in Peru supported by the three biggest banks in Peru, respectively. There are small differences between each one, but the basic characteristics are identical; there is a healthy competition environment in this sector. There are 83% Peruvian Internet users willing to acquire an Internet prepaid credit card at this very moment. This contributes greatly for the development of the country as well as spreading the Internet for business purposes.

Additional IPCE achievements are: obtaining the Vice-presidency of the E-Commerce Experts Committee for the Free Trade Area of the Americas (FTAA) composed by members of both private and government sectors; development of the APEC Readiness Guide on May 2000 as the only country to do so; being member of the Multi-sectorial Commission for Internet Access Broadening, created by the Peruvian Government; and creation of the suggested agenda for the new government for Internet Access Broadening and Development of ICTs in Peru.

3. New Economy and Policy

Despite inflation is not very high in Peru, the main problem IPCE has found is the economic recession that inflicts serious damage in the country since 1999, caused mainly by external factors. Albeit Peruvian economy has grown just 3,6% last year, the e-commerce and e-business industries in Peru showed an important growth over the last few years, as well as a growth on the Internet users in Peru. Nevertheless, some projects and important investments related mainly to Business-to-Business (B2B) e-commerce and e-business have been delayed, waiting for a clear political scenario and economic reactivation to happen.

IPCE has determined that a sector showing great advances in a short term is the Peruvian Government, through the use of the e-Government policies, implicating the use of ICT that the new economy offers to improve its relationship with the people. During a first phase, the offer of e-Government services was limited for businesses, but now the Government is paying attention to its citizens as well, mainly because there are now enough people with web access to justify these new policies. These technologies mainly provide official information and e-services based on considering the Internet as an interactive communication media. The new batch of e-Government policies being carried out is reflected on the recent creation of the Peruvian Government Portal.

In its constant duty of analyzing the actual situation of e-commerce in Peru, IPCE has found that Internet access costs for people and companies have been greatly reduced in the last couple of years, mainly because of the competition environment that exists nowadays; nevertheless, there is a long way due to follow: the access must reach every single person across the country. Now, most access is found in Lima, the capital city, limiting the reach of the benefits brought by the new economy.

On the financial area, many projects to build Internet focused SMEs have been halted because of the high interest rates in the Peruvian financial system. On the logistics area, some advances have been made in the past few years, even considering Peru has a very tough geography. The biggest logistic companies now have a shipment tracking web-based systems that allow customers knowing where exactly is their cargo. Additionally, Customs Authorities are developing great efforts to improve their processes by using the Internet and ITC. Peruvian Customs are going toward a paperless customs process, and will be exclusively web based on a medium term.

On the legal area, IPCE has been an important player in the whole legal e-commerce framework establishment, since it is an organization in charge of making proposals about e-commerce so that the business sector as well as the whole society result favored from an agile legal system specially focused on these new technologies. Peru has one of the most advanced legal systems in Latin America, and IPCE has actively participated in the making of cyber laws such as those for digital signatures and certificates, cyber crimes and contracts among absent people. Other cyber laws include e-mail legal notifications and tax-free importing of end consumer goods, which favors the foreign trade made by natural people through e-commerce.

Referring to the law on digital signature and certificates, it's waiting for the publishing of its respective regulations, so it can be applied on e-commerce, especially B2B. These laws will ease electronic transactions, making them more secure and more efficient. Over the past few months, the environment of competition on these new legal faces for e-commerce have been significantly developed, and it is becoming a very attractive sector.

Finally, IPCE is composed of young professionals deeply involved in the use of new technologies to achieve the organization's goals. Being an organization completely focused on new economy matters has required a highly trained staff compromised with the efficient use and application of these new technologies. The use of IPCE human resources is also important to apply this knowledge to directly help society. IPCE organizes different events to promote the use of these new technologies as well as giving general advice to anyone interested in this knowledge branch, especially for students and potential entrepreneurs. Likewise, IPCE is now developing educational projects to spread this knowledge to SMEs entrepreneurs, so they can use these technological tools from the new economy to raise their productivity, increase their efficiency and enter new global markets, improving the performance of this enormous business sector in Peru.

4. Summing-Up and Looking Forward

Summarizing, IPCE's vision is to promote and facilitate the development of electronic businesses throughout the country, spreading knowledge, promoting projects and watching for the establishment of a legal framework that promotes its development in Peru. The new economy represents for IPCE an excellent opportunity to achieve the development for the country, giving the necessary spread and promotion in the use of these technologies and benefits. In the near future, IPCE plans to continue its contribution and compromise with Peru, so that both people and companies could reach their complete insertion in the new

economy; additionally, IPCE will be focused on B2B and e-Government tendencies, which are very promising uses of the ITC brought by the new economy. Three recommendations IPCE would give as policy changes are:

- Improve people education, especially on the youth and children, so they can make a better use of the technological resources at their reach.
- Improve Internet access for the masses across the country, making possible that more people could have better and cheaper connections.
- Reduce the barriers that stop technological development, such as high tariffs for technological assets.

CASE STUDY: SINGAPORE e-GOVERNMENT

E-Government Planning And Management Division

Government Chief Information Office

Infocomm Development Authority Of Singapore

Introduction

Globalisation and the explosive entry of infocomm technology (ICT) into every facet of life have changed how people live and work, how companies do business and in particular, redefined the nature of government and its relationship with citizens. We have seen the remarkable changes that have taken place in the business sector with the advent of e-commerce. Similar changes are taking place in governments, spurred by the rising expectations of citizens and global competition.

To survive the fundamental transformations taking place today, all governments need to become e-Governments. For Singapore, e-Government is not simply about adding an “e” to government. It covers more than investments in infocomm equipment or setting up a website to publish information. e-Government requires that we fundamentally re-think all aspects of governance to see how we can leverage on technology and new business models to improve efficiency of internal processes as well as change the nature and quality of government interactions with both individuals and businesses.

In June 2000, Singapore launched its S\$1.5 billion e-Government Action Plan. Championed by both the Ministry of Finance and the Infocomm Development Authority of Singapore, and involving all ministries and agencies, it addresses issues that spans across all aspects of the public sector from leadership, delivery of electronic public services, internal government operations and ultimately economic competitiveness. With this plan, the Singapore Public Service is working towards the e-Government vision of becoming a leading e-Government to better serve the nation in the Digital Economy.

Route to E-Government—Government Computerisation

Singapore is one of few countries in the world with an integrated and coherent approach to computerisation in the public sector—thanks to an all encompassing Civil Service Computerisation Programme (CSCP) that aims to turn the entire Civil Service into a world-class exploiter of Information Technology (IT).

Since its launch in 1981, the CSCP has brought about many exciting changes to the way the Singapore government works, interacts and serves the public. Singapore’s move towards e-Government is built on the solid foundation of the CSCP, of which the progress and key strategies can be grouped into 4 main development stages:

First Wave (early 1980s): The National Computerisation Plan

It was clear that right from the start, national computerisation was high on the government's agenda. Singapore broke new grounds when the CSCP was launched in 1981 to spearhead the national computerisation effort, directed at improving public administration through the effective use of IT.

The first wave was directed at the automation of traditional work functions, reducing paperwork and clerical staff, and creating demand for the new IT industry. The implementation strategy was to start small and scale fast. The programme, started with the involvement of 12 ministries/departments and 150 IT staff, is extended service-wide today. The National Computer Board (NCB), set up as a central authority to promote and implement IT in 1981, played a key role in co-ordinating the implementation of the programme across the civil service.

The first phase of the CSCP has resulted in significant manpower savings. A cost-benefit review by the Ministry of Finance in 1985 showed that CSCP had generated an impressive 171% return on investment. This was in addition to the many intangible benefits such as operational efficiency improvement, better information support for decision making and new services for the public. These achievements have driven the civil service on, in its quest for organisational excellence through IT.

Second Wave (mid 1980s): The National IT Plan

In the second wave, CSCP strategies have matured over the years from improving internal operational efficiency and effectiveness to providing integrated services to the public through cross-agency linkages. This era of inter-organisational communication and co-ordination saw the creation of three Data Hubs (Land, People and Establishment) to cut down redundancy in data capturing and promote cross-agency data sharing within the government.

An increasing number of public services were developed in the direction of "one-stop non-stop services" for the public and businesses. Some of the award-winning applications include the School Links, Integrated Land Use System (ILUS), One-stop Change of Address Reporting Services (OSCARS), and the various networks such as TradeNet, LawNet and MediNet.

Third Wave (early 1990s): IT2000

The opportunity for further improvement would be limited if the policies were confined to the domestic IT market. The government met the challenges head on and formulated strategic thrusts to develop Singapore into a global IT hub, improve quality of life, boost the economic engine, link communities locally and globally as well as to enhance the potential of individuals. This plan, unveiled in April 1992, is commonly known as IT2000—The Intelligent Island Vision.

For the CSCP, IT2000 gave greater emphasis to the trend that has already begun—the integration of computing resources in the civil service, through the consolidation of computing facilities in a data centre and through the setting up of a civil service-wide network. At the national level, one of the key deliverables was the creation of an advanced National Information Infrastructure (NII) which comprises the infrastructure level of networks and the value-added applications such as National Contact Information Service (NCIS), Electronic Commerce (EC) applications, Infrastructure for Electronic Identification (IEI), and content hosting.

Fourth Wave (late 1990s onwards)—Infocomm 21

In the late 1990s, the focus was quite clearly on the possibilities brought about by proliferation of the internet technology and the convergence of IT with telecommunication. Singapore's internet-based e-filing system for individual taxpayers stood out among many widely-acclaimed applications as the world's first when it was launched in 1998.

More importantly, the Infocomm Technology revolution requires a paradigm shift. Strategies that have worked well in the past may no longer be as relevant for this new economy paradigm. Competition is global. Infocomm 21, a five-year plan for infocomm in the New Economy, is Singapore's strategic response to this challenge. At its heart is a vision to develop Singapore into a vibrant and dynamic global Infocomm Capital with a thriving and prosperous e-Economy and a pervasive and infocomm-savvy e-Society.

Singapore's move towards e-Government resides within Infocomm 21, as a strategic thrust aiming to better serve Singaporeans in the New Economy.

Singapore E-Government Action Plan

The Singapore Government intends to be one of the best e-Governments in the world with the innovative and efficient delivery of high quality services to the public, private and people sectors of the new digital economy. Whenever feasible, government services and transactions will be delivered and conducted through electronic means. "Citizen-centric" services will provide seamless end-to-end services to all constituencies.

To realise Singapore's e-Government vision, an e-Government Action Plan was drawn up after wide consultation with all levels of public sector officers. It charts the strategic thrusts and programmes that guide the public service in realising the e-Government vision, while retaining the flexibility to adapt to changing needs.

Strategies and Programmes

The Action Plan presents five strategic thrusts for our e-Government activities.

S1: Re-inventing Government in the Digital Economy

Governance in the Digital Economy requires a clear understanding of the impact of ICT on both internal processes in the public sector and transactions with citizens and businesses. The Digital Economy demands reviews of policies, regulations and processes to align them with the rapid developments in the economy and to meet rising expectations from the public. Public officers must therefore be prepared to change their tried and tested ways in transforming government.

S2: Delivering Integrated Electronic Services

Increasingly, citizens are demanding public services to be delivered online, anytime and anywhere, at their convenience. Greater value will be created for the public if electronic services are integrated and centred around customers' needs. The Singapore Government has set an ambitious goal for its Public Service with the end objective of providing a convenient one-stop, non-stop service for the public.

S3: Being Proactive and Responsive

As "time to market" for new services becomes an important consideration, government agencies are expected to adopt the same "sense and respond" approach as the private sector in anticipating citizens' needs and delivering responsive systems and services with speed. Existing services and processes also need to be fine-tuned to meet customers' changing needs and in line with new technological possibilities.

S4: Using ICT to Build New Capabilities and Capacities

ICT offer tremendous opportunities to create new value; to tap the power of collaborative knowledge management; and to provide instant knowledge and processing capability to make quantum leaps in service delivery. The public sector will go beyond using infocomm technologies as a system, but also to radically re-engineer government processes to benefit from the new business models of the Internet era.

S5: Innovating with Infocomm Technologies

To be a leading e-Government, innovation and experimentation are primordial. Public officers are encouraged to be enterprising and be accustomed to situations whereby there is no one to learn from, simply because they are the first ones there.

Where We Are Today

At the core of government IT infrastructure is the GovII, a multi-layered IT infrastructure, that links public sector agencies to facilitate communication between the civil service as well as with external bodies and the public. It enables a "Connected Government" through which people communicate and work together more effectively and where services are delivered to users in an accessible and timely manner.

Singapore ONE (One Network for Everyone), the first nation-wide broadband information structure in the world, is available islandwide. All the universities and polytechnics are wired with sophisticated campus-wide networks. At primary and secondary schools, we are on target to equip every two students with one personal computer and for 30% of the school curricula to be IT-based by 2002. 59% of Singapore households own PCs while 58% of the residential population subscribe to the internet.

Government-to-Employee

Within the civil service, among the infrastructure and suite of applications delivered over the GovII are the Public Sector (PS) Smart Card, Government Electronic Mail System (GEMS) and the Government Intranet. These enable better communication and sharing of information within and between government departments, allowing public officers to work together more effectively.

The government email system, which has a base of 31,000 users from ministries and statutory boards is now handling 12 million mails per month between civil servants, and five million email exchanges between the government and the public annually.

Government-to-Customer

The eCitizen portal heralds a new era for the Singapore Public Service. The concept requires agencies to work across boundaries to integrate information, processes and systems so as to provide a seamless online experience to the public. It adopts the metaphor of a citizen journeying through life, who along the way goes through certain events and is required to complete certain tasks. Government information and services are integrated into multi-agency packages (called "Service Packages") in a way that every person on the street can relate to, such as "Move House", "Attend Primary School", or "Look for a Job". Service Packages are as far as possible chronologically ordered, reflecting a typical Singaporean's life from birth to death, in order to cover all aspects and events in the citizen's life.

To date, more than 680 eServices have been made available online by the various government agencies with 50 eService Packages and 170 eServices in the eCitizen portal. For 2001, we are targeting a total of 200 eCitizen online services and 60 service packages to be made available to the public.

Government-to-Business

On the G-to-B front, we are looking at GeBiz (Government Electronic Business), which is an integrated, end-to-end, web-based system to facilitate online procurement within the civil service. GeBiz offer individual departments and the government as a whole, sophisticated procurement information management, detailed tender statistics and reduced manual data-entry. For suppliers, it will be a one-stop, round the clock web-site for electronic submission of quotations, offers and invoices.

The Threaded Path

Singapore has travelled a long way in its efforts of government computerisation and has collected numerous accolades that marked our commitment and belief in IT. The eCitizen initiative is rated as one of the best public service delivery platforms in the US Federal Government's survey on Integrated Services Delivery in 1999. Singapore was rated one of the five leaders in eGovernment, after US in Accenture 2000 survey and again in 2001, after the Canadians.

While the path is never always smooth and glamorous, there are several contributing factors which have brought us this far.

Singapore's experience in CSCP has proved once again that foresight and leadership are critical to the success and sustainability of such large-scale projects. Right from the start when the ministerial Committee for National Computerisation (CNC) put forward the CSCP in 1980, it was never intended to be a stand alone project, but subsumed under a greater national goal of building a software centre in Singapore. Such a two-prong mandate of increasing government productivity and developing the demand side of the software industry has enabled the CSCP to garner the required attention and resources for its successful implementation.

The commitment of the public service towards organisation excellence is also an equally important factor. From the productivity campaigns in the early 1980s to the current Public Service 21 vision, the Singapore public service has always strived to improve itself to better serve the public. It is this common goal towards excellence which has propelled us to new heights through the use of technology.

TradeNet, launched in 1989, provides traders, freight forwarders and shipping businesses with a single point of access to exchange trade documentation electronically with more than ten government controlling agencies, including the Trade Development Board, the Customs and Excise Department. The OSCARS benefited the public by linking the National Registration Department (NRD) to relevant agencies such as the Public Utilities Board and the Work Permit Office. Notification of change of address at NRD would activate changes in all relevant agencies automatically.

Cross-agency applications such as these were developed long before integrated services become the catch-phrase of the day. This service-wide vision towards excellence and the buy-in on technology as a key tool have brought ministries and agencies out of their silos and built the foundation of inter-organisational co-operation for integrated service delivery.

The pace of technology is rapid and one has to be in step in order to reap the greatest benefits. Singapore recognises the need to be quick in "time to market" and has made concerted efforts to review its plans and strategies regularly to ensure relevance and flexibility in the ever-evolving technology landscape. Government agencies are expected to be nimble and adaptive to change; the National Computer Board (NCB) being a good example. Formed in 1980 as a statutory board under the Ministry of Finance, it became under the purview of the Ministry of

Trade and Industry in 1997 to create better synergies among economic development and industry-promoting agencies. Within this period, 1996 was another year of corporate transformation for NCB. A wholly owned subsidiary was spun off from NCB to look into the development function of CSCP and the remaining reconstituted to become the Government Chief Information Office. The key milestone of NCB evolution is its merger with the Telecom Authority of Singapore (TAS) in December 1999 to become the present Infocomm Development Authority of Singapore (IDA), following the convergence of telecommunications and the information technology.

What We Are Working Towards

Six programmes have been identified to drive the strategic thrusts in the e-Government Action Plan. These will be our main focus for 2000-2003.

P1: Knowledge-Based Workplace

Public officers will be empowered to be knowledge workers who engage in active and collaborative learning and knowledge-sharing as part of a culture of continuous learning. Learning itself will increasingly be performed online, i.e. e-learning.

P2: Electronic Services Delivery

With the public's growing acceptance and usage of the Internet, the Singapore Government has been working towards electronic delivery as the key delivery channel for public services. The eCitizen portal (www.ecitizen.gov.sg) is the main Government-to-Customer initiative, which aims to provide one-stop, non-stop on-line services and information to the public with the public in mind. It requires government agencies to work across boundaries to integrate information, processes and systems so as to provide a seamless online experience.

P3: Technology Experimentation

Public sector agencies will be encouraged to experiment with new technologies that could potentially revamp the way they work. Agencies can pioneer initiatives, which are “first-of-its-kind” or “first-in-its-series” in the public sector, on a trial or pilot basis to better understand what new capabilities these technologies can offer and how they can benefit their organisations and customers.

P4: Operational Efficiency Improvement

The public sector will continue to identify and invest in new systems that improve operational efficiency. In doing so, public officers should however actively ask radical and fundamental questions to review the relevance and usefulness of functions and processes, and whether these could be streamlined to take advantage of the new capabilities made possible by the Internet age.

P5: Adaptive and Robust Infocomm Infrastructure

Infocomm infrastructure investment in the public sector will be channeled to enable the advent of a knowledge-based workplace and the delivery of integrated electronic services, in addition to improving operational efficiency. These include both agency-specific projects as

well as service-wide infrastructure projects where the emphasis is on scalability, robustness and cost-efficiency.

P6: Infocomm Education

The infocomm education programme will target all levels of the public sector. It extends beyond traditional IT literacy, skills and application systems training to focus on managers' capacity to take advantage of growth in infocomm capability to revamp internal processes and external service delivery. This will facilitate the participation of public officers in the process of "re-inventing government" by making meaningful policy decisions in all aspects of governance in the Digital Economy.

The Road Ahead

Singapore has progressed well so far, but the road to eGovernment has just begun. There remains much to be achieved and it will not be easy. Before the dotcom hype, we were committed to IT; as the era come and go, we are still as committed. We believe that it is this long-term belief and commitment in the innovative use of technology that will see us through this exciting and challenging journey.

CASE STUDY ON BUSINESS-TO-BUSINESS E-COMMERCE AT TAIWAN SEMICONDUCTOR MANUFACTURING CORPORATION

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Over the past two decades, the integrated circuit (hereafter IC) semiconductor industry has undergone profound structural change characterized by a process of increasing disintegration (see Figure 1; all figures are at the end of the case study). Within this process, alongside the vertically-integrated integrated device manufacturers (IDMs), pure-play foundries have emerged with the aim of carrying out contract work for external customers, which in turn has facilitated the proliferation of fabless design houses. Moreover, the emergence of the System-on-a-Chip (SOC) has induced the modularization of various design technologies, known as silicon intellectual property (IP), which can be used repetitively as the main building block for SOC. This trend has given rise to 'chipless' IC firms, acting as pure providers of IP without owning a fab or even a chip, leading to further disintegration of the industry.

Taiwan Semiconductor Manufacturing Company (TSMC) may be regarded as a major catalyst in the above-mentioned evolution of the industry. The company was founded in 1987 in Taiwan's Hsinchu Science-based Industrial Park, and was listed first of all on the Taiwan Stock Exchange (TSE) in 1994, and subsequently on the New York Stock Exchange (NYSE) in 1997 under the trading symbol of TSM. The company currently employs 14,500 people worldwide, and posted annual sales of US\$5.3 billion in 2000.

TSMC was created to function as a dedicated foundry service provider, but in so doing, it is not involved in IC design and does not have any own-brand products. It simply carries out contract fabrication work for global customers ranging from start-up ventures to world-leading IDMs. Therefore, customer relationship management, as well as fabrication capability and capacity, are central to TSMC's operations, in which e-commerce has come to play an increasingly important role.

E-business in TSMC started in 1995 with the introduction of Total Order Management (TOM) as a tool for bridging supply and demand in fabrication, and for order and production scheduling. TSMC has also formed electronic links with its suppliers by implementing continuous replenishment programming (CRP) in order to minimize its inventory costs; however, these can only be considered as the most basic elements of TSMC's 'extended' supply chain management.

In the 'arms-length' relationship between foundries and fabless design houses, it is essential to manage the flow of knowledge so as to facilitate a smooth and efficient transfer of new designs into production. This has been made possible by the design firm's adherence to 'design rules' laid out by the foundry, namely restrictions on the type of designs that will be manufactured in the foundry on a specific delivery schedule. These design rules are determined by the foundry's manufacturing capability and capacity. In light of this, foundries

such as TSMC have become part of the network of innovation of new IC designs, which entails close knowledge interactions between foundries and their customers. As a result, TSMC initiated the concept of the 'virtual fab' in 1996 in order to promote virtual integration with its customers by means of business-to-business (B2B) applications, thus rendering TSMC as the facilitator of its customers' supply chain management.

Apart from online regular business transactions, TSMC's B2B, under a total package of 'eFoundry' covers three major aspects: logistics, engineering and design (see Figure 2). The eFoundry consists of a suite of Internet-based applications that provide TSMC's customers with real-time support in wafer design, engineering and logistics, functioning as the master tool for the concept of the virtual fab. It currently supports five online services, including TSMC-Online (updated to version 3.0), TSMC-Direct, TSMC-YES (Yield Enhancement System), TSMC-ILV (Internet Layout Viewer) and eJobView (see Table 1). Amongst these, TSMC's customers have shown a preference for TSMC-Online as a one-stop tape-out service. This also features the Webex Internet conference forum capability for customer engineering and other communications and collaborative views of charts, screenshots, and SEM pictures.

In terms of collaboration in logistics, TSMC-Online provides access to real-time production and logistics information updates in areas such as the status of wafer fabrication, assembly and testing, and in order handling and shipping. As for engineering collaboration, TSMC-Online provides a variety of engineering capabilities, including interactive views of prototyping, lot status, yield analysis and quality reliability data. It is also empowered with design collaboration capabilities in support of customer access to important information needed during the design process. Aided by Design Service Alliance, to which we shall return later, TSMC-Online provides selected blocks of IP owned by third parties—these are robust design solutions that conform to the production technologies of TSMC—which are then made available to designers. According to Lawrence Chen, TSMC's E-Commerce marketing manager, "[customers] using TSMC-Online 3.0 now have a personalized window into the foundry this advances the concept of a Virtual Fab to new levels by providing the power to select the exact production information to monitor wafers in both engineering and mass production stages".

In terms of service coverage, TSMC-Direct is similar to TSMC-Online, but the former is a system-to-system method of integration between TSMC and its business partners which uses specific software to link mission-critical business processes, whilst the latter is open to wider access, since it is Internet-based. TSMC-Direct acts as an extension of customers' own internal systems enabling collaborative planning, work in progress tracking, engineering data sharing, real-time order placement, confirmation and other important business control features.

Through the use of TSMC-YES, TSMC's customers can perform yield enhancement analysis remotely from their workstations or PCs using exactly the same tools, data and models as those employed by TSMC's engineers. This purports to promote engineering collaboration between TSMC and its customers in order to achieve shorter yield analysis cycles, improved yield enhancement efficiencies and faster ramp to production.

In addition, both TSMC-ILW and eJobView are specifically instrumental in design collaboration. TSMC-ILV is a real-time web-based distributed layout information viewing service providing an engineering collaboration platform for communicating on issues relating to layout. Through these means, designers can interactively review, navigate, highlight and discuss layout issues with TSMC's service engineers. As a result, it may be possible to achieve improved design productivity, lower engineering and debugging costs, and faster time-to-market.

TSMC's eJobView is a mask inspection software system—the first of its kind in the foundry industry—which allows external customers to view mask images anytime or anywhere through their favorite web browser. Foundry mask data sign-off previously involved several days of inspection and discussion, and even expensive air travel costs for international customers. In contrast, through the use of eJobView, mask image inspection is immediate, with remote teams now able to discuss critical projects in real time, leading to faster time to tape-out, lower development costs and faster time to volume.

In order to facilitate design collaboration, TSMC has also formed a Design Service Alliance with third parties. As mentioned earlier, the emergence of SOC has spotlighted the importance of silicon IP, and as a result, IC design has come to resemble the assembly of IPs, from both internal and external sources. Design houses are also faced with the challenge of choosing from amongst a variety of library suppliers and Electronic Design Aid (EDA) tools. TSMC previously functioned as a pure-play foundry with limited design service capacity, but with Design Service Alliance, the company can now mobilize external resources to facilitate the design processes of its customers.

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Design Service Alliance encompasses the four service areas that make up the IC design process—third party libraries, silicon-verified IPs, experienced IC designers and proven EDA software. A network of leading third party library vendors form the core of the Library Alliance; this enables TSMC's customers to gain access to required technical services, leading edge process-specific technologies and documents on design requirements. IP Alliance encompasses a large category of silicon-verified and production-proven foundry specific IP, which are useful for designers in IP assembly.

Through the Design Center Alliance, TSMC helps its customers to connect to a global network of qualified and experienced IC design centers to gain the necessary design expertise. Similarly, through the EDA Alliance, TSMC's design service engineers work with EDA Alliance members to deliver TSMC-specific technology files and design kits that may simplify its customers' design experience. In essence, the Design Service Alliance as a whole aims to provide TSMC's customers with total IC design solutions to accelerate cycle time from specification, through tape-out, to finished wafers. Both TSMC's customers and the key testing and packaging firms can gain access to the Design Service Alliance using TSMC-Online as the platform.

TSMC's customer services have also been extended to collaboration on prototyping through CyberShuttle. First launched in October 1998, CyberShuttle allows multiple customers to share the costs of a single mask set and prototype in a pilot run. It aims to help customers

substantially reduce their non-recurring engineering (NRE) charges for small wafer volumes, providing fast and cost-effective prototyping. According to TSMC, Cybershuttle will launch 93 multi-project wafers during 2001, with the first half alone almost matching the 50 shuttles launched throughout the whole of last year. CyberShuttle has grown in popularity because, according to Mike Pawlik, vice president of marketing at TSMC: “[first], it provides access to state-of-the-art silicon for advanced prototyping at an affordable price second, TSMC’s ability to assemble these and turn around the working prototypes is exceptional. Designers rightly see the CyberShuttle program as a way of reducing design risk and getting to market faster”.

In sum, whilst starting out as a stand-alone OEM foundry, TSMC has come to resemble a provider of integrated service packages covering a wide range of value chain management activities thanks to its extensive application of e-commerce. Basically, through its arms-length relationship with its customers, TSMC is not just a pure manufacturer; it has become the natural place to verify the manufacturability of its customers’ designs and to ensure the quality and timely delivery of their finished wafers. The ability of the electronic Internet and e-commerce links to accelerate and broaden information transfer between TSMC and its customers not only helps to simplify their tasks of knowledge management and exchange, but also induces TSMC to widen the scope of its extended supply chain management activities.

In a sense, the method of e-commerce deployed by TSMC, or more specifically TSMC-Online, acts like a portal providing comprehensive support for its customers’ major operational tasks, ranging from prototyping and design, to engineering and logistics. In terms of design, aided by B2B Internet applications, TSMC has drawn on a portfolio of design solutions from third parties to help its customers to achieve better designs, more reliable design reuse, and faster time-to-market, leading to virtual integration of a network of firms.

In TSMC’s B2B e-commerce model, goods and cash flows are secondary to information flows. As a pure-play foundry, its inventory costs for finished products are not an important issue, whereas in contrast, customer relationship management is regarded as central to TSMC’s operations as a means of securing its rates of capacity utilization and profitability. In addition, from their own view, B2B e-commerce is necessary for foundries to come to terms with the trend towards SOC. Therefore, TSMC’s e-commerce initiatives aim to meet the across-the-board needs of its customers, in order to enhance customer loyalty.

Given the importance of information flows, which are first and foremost in TSMC’s operations, it is essential for the company to ensure that its customers and partners gain real-time, continuous access to its B2B applications; however, Internet-based applications, such as TSMC-Online, are vulnerable to Internet traffic jams and disruption. To overcome such problems, TSMC recently added ‘dual-site’ capabilities to its e-commerce systems. For example, an Online 3.0 routing system now automatically switches users to one of two ‘mirror sites’—whichever is hosting the least amount of traffic. According to tests performed by an independent consulting firm, Online’s dual-site capability has improved the data download time in the US by up to 60 percent. During the Taiwan-to-US cable damage incident in February 2001, the dual-site capability continued to give users around the globe continuous access to TSMC-Online without disruption. In light of this, government efforts

need to be geared towards upgrading ICT infrastructure in order to facilitate B2B e-commerce in firms such as TSMC.

Figure 1 Disintegration of the IC Industry

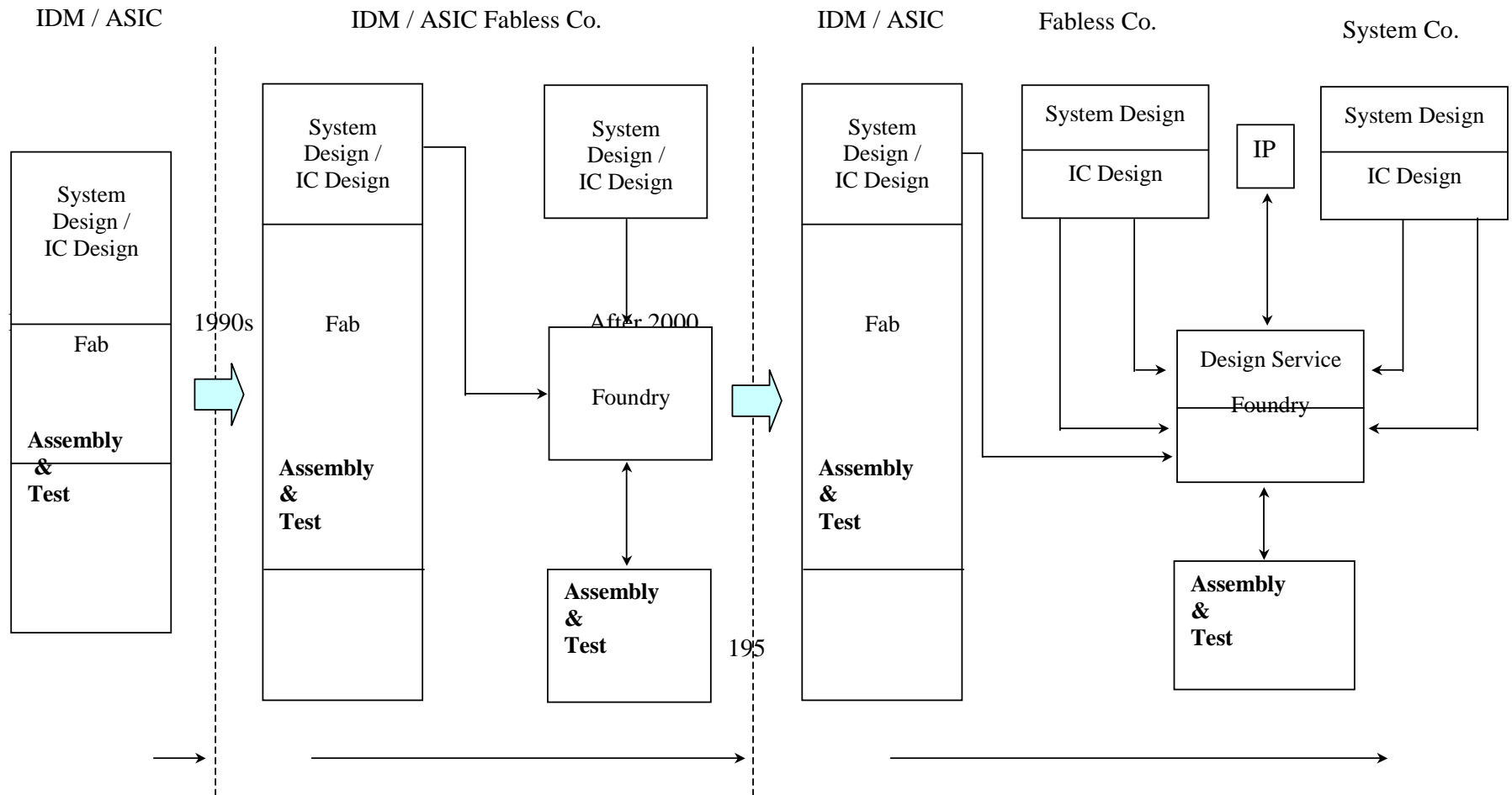
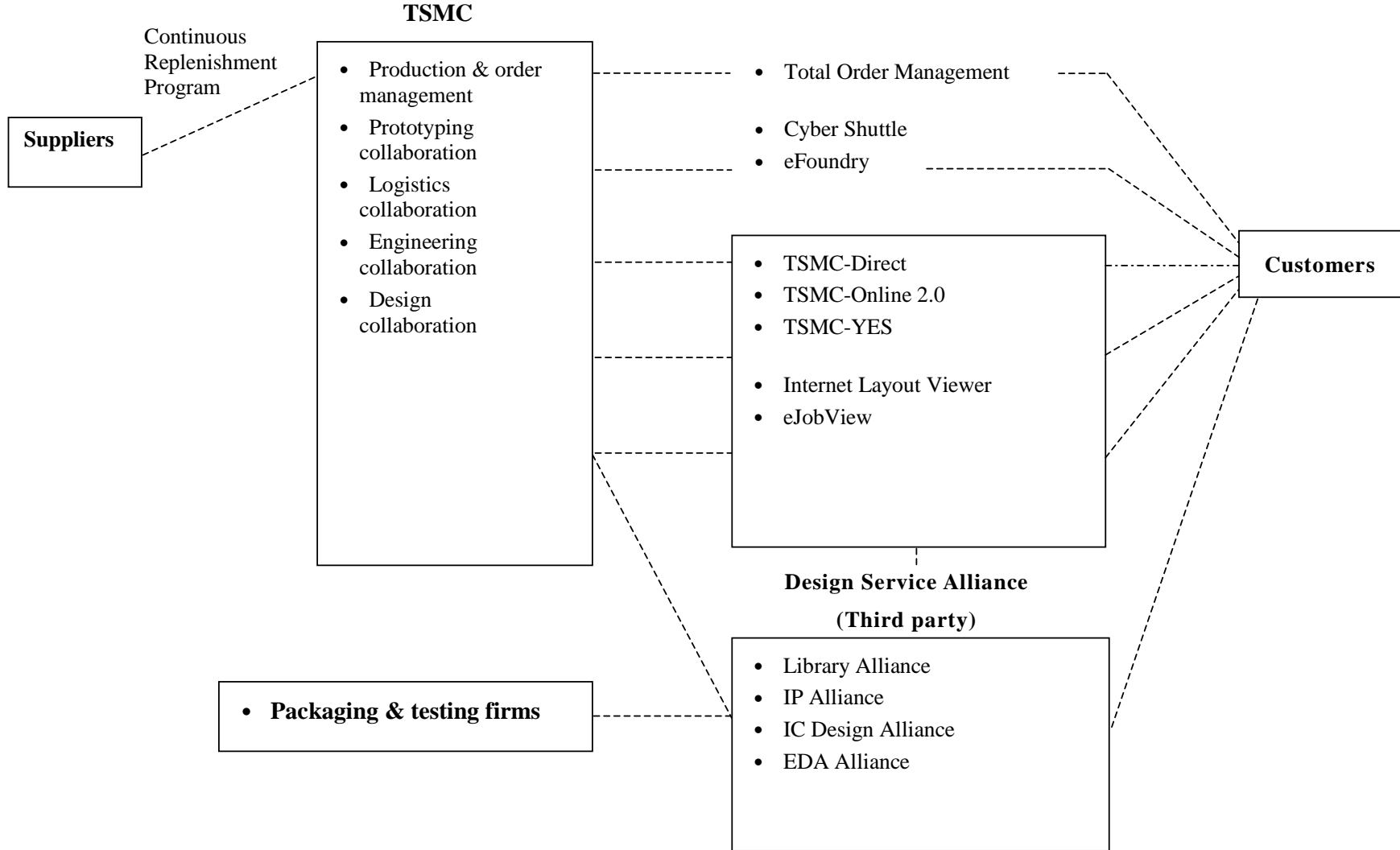


Figure 2 The Framework of TSMC's e-Business



Business Cycle	Documen	TSMC Online	TSMC Direct	TSMC YES	TSMC ILV	eJobView	How to
Foundry	Company	0	X				<div style="border: 1px dashed black; padding: 5px; margin-bottom: 5px;"> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center;">Online.tsmc.co</div> <p style="text-align: center;">>>TSM-Online</p> </div>
	Foundry service	0	X				
	Technology	0	X				
Product	Design	0	X				
	PCM	0	X				
	Process	0	X				
Mask	Design	0	X		0		<div style="border: 1px dashed black; padding: 5px; margin-bottom: 5px;"> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center;">Jobview.tsmc.t</div> <p style="text-align: center;">>>ejobView</p> </div>
	Foundry service request	0	X				
	Magnetic tape	0	X				
	Mask data	0	X			0	
	Mask field	0	X				
Wafer Manufacturing	Purchase	0	0				<div style="border: 1px dashed black; padding: 5px;"> <p style="text-align: center;">>>TSM-Direct >>TSM-YES</p> </div>
	Order	0	0				
	Shipping	0	0				
	Shipping	0	0				
	Backlog	0	0				
	Testing		0				
	WAT	0	0				
	Wafer sort	0	0				
	QA	0	0				
	SPC	0	0				
Process reliability data	0	0					
Engineering Analysis & Yield	Engineer data & Analysis tool	0	0	0			
Enhancement Customer Satisfactio	Customer complaint issue & Status	0	0				

Note: 0 = available x = service per request

THAILAND SCHOOLNET PROJECT

In 1995, as part of the IT promotion activities during Thailand IT Year campaign, NECTEC had extended the ThaiSarn Network (a research and education network connecting universities) to link secondary schools. The project is called Thailand SchoolNet Project, which was started as a demonstration project with 50 public secondary schools in various parts of the country. The aim of the project is to enrich teaching and learning in schools by providing a channel to access the world's "virtual" library, and a channel to exchange information between and among teachers and students, not only within schools, but across the world, through the Internet. The project is run by NECTEC, in collaboration with the Ministry of Education and Ministry of Transport and Communication (through the Telephone Organization of Thailand-TOT and Communications Authority of Thailand-CAT).

During the early phase, a strong boost to the SchoolNet was led by private sector participation where three vendors (i.e., Compaq, Intel, and Powell Computer) joined the project and donated one Pentium computer to 32 schools in the rural areas. Microsoft further donated 50 sets of Windows '95 and utilities to speed up the schools' activities on the Net.

By participating in the project, the school will receive free Internet accounts (three accounts per school), and a space (5 MB) on the central server to put their school's web pages. In addition, the school can join activities such as training courses, and other collaborative projects with other schools.

SchoolNet is the first and only network that **provides universal access to users** (i.e., teachers and students). More specifically, with help from the TOT and CAT, schools all over the country can access SchoolNet via a dial-up mode (using #1509 access No.) and pay only a local telephone charge (i.e., Baht 3 per call). Presently, there are approximately 1,620 schools nationwide connecting to SchoolNet (www.school.net.th), with approximately 500 having their own web sites.

Besides provision of Internet access, NECTEC has also placed emphasis on two other equally important measures, i.e., **training of teachers** and promotion of **content development** in local language (including promotion of Internet activities in the classroom). Teachers training now is run, using the course developed by NECTEC, by 36 Rajabhat Institutes nationwide.

On the issue of content, NECTEC has initiated many pilot projects/activities, such as:

- Classroom 2000
- Digital Library
- Digital Archive

Furthermore, NECTEC also encourages schools to participate in international collaborative projects, such as, GLOBE (Global Learning and Observations to Benefit the Environment), AT&T Virtual Classroom, and Thinkquest Project. Other programs that have been initiated to support SchoolNet are, for example, SchoolNet volunteer program, student camp and web

competition on selected subjects, etc., where support came from private or non-governmental sector.

For schools that are ready to run their own server, NECTEC provides a special course on Linux-SIS, its own distribution of Linux, to be used as a School Internet Server. SIS is very popular in Thailand due to its excellent documentation in Thai language, its simple-to-install CD-ROM and web-based server management without the need to know UNIX commands. SIS training courses are always in constant demand from schools looking for a reliable Internet server at the lowest cost.

In October last year (1999), the Cabinet had approved the expansion of SchoolNet to cover 5,000 schools nationwide, as part of the celebrations of His Majesty the King's 6th Cycle Birthday. Once the budget is approved by the budget bureau, implementation can start immediately. It is expected that by the end of 2002, the target of 5,000 schools should be met, where all secondary schools (approx. 3,000) will be connected.

CASE STUDY:VIET' NAM 'GREAT BLESSING' POLYCLINIC—A SUCCESS STORY

Dr. Mai Anh

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In early 1998, an overseas Vietnamese whose name is Le Ngoc Long came home to set up a private limited company trading in apparel. In mid 2000, Long decided to expand his business to health services. He launched a polyclinic called 'Great Blessing' with approximately 30 doctors and nurses in September 2000. The polyclinic located at 42 Ngo Thi Nham, Hanoi, Viet Nam.

As he had experienced e-mail as an effective tool to communicate with his apparel partners through his personal computer, he made up his mind to select Internet as one of the principle marketing channels for his health services. However, because of the limited knowledge of his staff in doing business on the net, Long co-operated with the Internet Center of The Corporation for Financing and Promoting Technology FPT, the 2nd largest ISP in the country, to develop a website to disseminate information relating to health services to the whole world. FPT acted as the web design and hosting provider for the polyclinic.

In early September 2000, the construction was finished and the website was launched at the <http://www.phongkhamhp.com.vn/>.

In the initial stage, the website only included static web pages containing introductory information, services description, and price list. The website got over 1,100 visitors after two first months of operation.

However, due to the fact that Internet users not only wanted to get information, they also would like to arrange appointments with doctors and get online health consultancy via the website, Long decided to turn his website into a dynamic and interactive one so that he can get online feedbacks and orders from potential Internet clients. After the first week, the polyclinic received 50 orders via the website.

In February 2001, Long put an advertising banner linked to his website on some famous Viet Nam websites such as FPT (<http://www.fpt.vn/>), Viet Nam Express (vnexpress.net), Viet Nam E-commerce (www.vne.com.vn), etc. to increase the traffic to the website. In addition, the polyclinic also distributed leaflets containing the web address <http://www.phongkhamhp.com.vn/> to its clients for reference.

After a very short time, the number of visitors to the website exceeded 6,000 per month, 200 of which made health consultancy request via the net. The average number of clients to the polyclinic increased from 40 patients per day in October 2000 to about 100 patients per day in April 2001.

When asked, Long said, “Internet really helps my clients more satisfied and drives more prospects to the polyclinic. But we have to do everything by ourselves.”

Really, what Long and his men have gained bases only on their own efforts. They almost get no support from any governmental organization. The only organization provided them a ‘free support’ was Vietnam Association for Information Processing (VAIP). With this help, Long could put his advertising banner on VAIP homepage at the <http://www.vne.com.vn/> for free. According to Long, he has no information if the country has any project that supports small and medium businesses like his to develop the application of IT into business.

The Internet growth in Viet Nam for the past 4 years has contributed to the development of Long’s online health services. With nearly 130,000 dial-up users in the country in June 2001, the Internet market is a good source for Long’s business. Long also has worked out some promotions for urban Internet users who have rural relatives in order to attract a great number of rural prospects.

But because of the low speed of data transfer on the local network and high cost of Internet usage, still less-than-expected number of Internet users access his website. Moreover, there is almost no rule of law regulating business activities on the net in Viet Nam. So Long was more cautious in online transactions.

Therefore, if the communication network infrastructure is improved, the cost of Internet usage is lowered down, new Internet business rules of law are released, Long will have more opportunities to take advantages of the digital economy. He said, if the cost reduced, he might double his investment in the industry.

Another big problem is human resource. Although thousands of IT students graduate in Viet Nam every year, Long have found it difficult for him to recruit IT-qualified staff to administer the website. Because the proper administrator must not only be IT-friendly but also business-minded. Viet Nam is in shortage of such human resource. Long consequently will have to buy web and e-commerce solution from FPT, who is his web hosting provider as well. This has cost him a great deal of money.

Anyway he has recruited some graduated students and asked FPT for training the staff. Now Long has 2 administrators who are able to manage the website. They have rights to access FPT Internet servers from remote computers to perform tasks like updating the website.

In the next few months, Long and his men are planning to develop an online health encyclopedia so that his website will become the Number 1 Internet health service portal in Viet Nam. He also intended to launch an e-mail marketing campaign to send advertising e-mails to some tens of thousands of Viet Nam-based Internet users.

According to Long, if a small and medium business in Viet Nam would like to be successful in the digital era, it would get a considerable technical and financial support from a governmental or international organization.

What Long has done is actually only an experiment.