

**ASEAN CASE STUDY**  
**SOFTWARE INDUSTRY IN JAPAN**  
**NDR CO., LTD.**

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In the middle of 1980s and following the annual 20 percent dramatic growth rates in the global software industry, Mr. Takatsugu Nagahara resigned from a large Japanese IT company to establish NDR Co., Ltd. ("NDR") in 1984 with an initial paid up capital of Yen 5 million (US\$55,000), to engage mainly in software development, hardware development and system integration.

The main office of NDR is located in the central part of Osaka City, the second largest city in Japan next to Tokyo, with a satellite office in Mishima City, Shizuoka Prefecture. In addition to these domestic offices, the company has established one subsidiary in Bangalore, India and the other in Bangkok, Thailand.

As of December 2012, the Japan offices of NDR had a total of 75 employees. Out of these 75 employees, 32 are Indian electronics engineers, 10 are Thai engineers and 31 are Japanese engineers. This was rather unusual for a Japanese software company to hire so many foreign engineers.

NDR has diversified corporate clients that include investment banking, ship-building, electric components manufacturers, steel mill, etc. (see Exhibit A -Brief Company History; Exhibits B&C - Line of Business and Exhibit D - Client List).

When Mr. Nagahara established his own IT firm in 1984, Japan was showing software development mainly taking place within large corporations. Except for consumer software such as videogame and animation design, corporate software had been produced by in-house or subsidiaries of large systems integrators such as NEC, Fujitsu, Toshiba, Mitsubishi Electric and Hitachi (see Exhibit E- Top Ten System Integrators in Japan).

System integrators are those firms which specialize in planning, design, implementation and maintenance service, putting together component subsystems into an integrated computer system and making sure that these subsystems work together in a seamless fashion. This often involves customization of innovative software applications tailored to specific large corporations belonging to a specific keiretsu (corporate group).

Partly, the strong need for system integration services was driven by the heavy use of customized corporate software in Japan, contrary to popular pre-packaged software in the United States. Most Japanese corporate software was still in developing mainframes and mid-range computers and large firms accounted for most software use. Customized software for corporate users accounted for 85% of the total Japanese software market, whereas 65% is the prepackaged software products in the States.

In 1985, there were less than 1000 software companies. Among these, more than 85% are small to medium-sized companies who are under the umbrella of large system integrators as subcontractors and vertically integrated.

Because of this prevailing business structure in Japan, there were only a few independent small to mid-sized software houses.

Large systems integrators locked in their corporate clients by supplying highly customized software, creating a barrier for SMEs to penetrate this market.

Under such circumstances, it seemed a risky decision for Mr. Nagahara to set up his own independent software company. Nonetheless, he foresaw that there would be more opportunities for independent software developers to play an important role since the computer market is expanding to include a large number of smaller corporate users who would require smaller and less expensive computer systems.

However, contrary to the vision of Mr. Nagahara for the early stage of his venture,

the major portion of the revenues was from subcontracting works given by large system integrators. Despite this unwilling source of income, the revenue was increasing steadily, thanks to the growing demand of customized software in Japan.

The booming software market directly benefited from the bubble economy, which lasted from 1986 to 1990.

During this period, real estate and stock prices greatly inflated. Between 1986 and 1991, the value of the Nikkei Stock Index more than tripled. Land prices climbed with the stock market.

In 1989, at the peak of bubble economy, the value of the land in the Tokyo metropolitan area alone was greater than the value of all the land in many Western countries.

With this inflated asset value, most of the corporations easily borrowed money from banks and insurance companies for capital investment, such as expensive computer systems, real estate and corporate acquisition.

Large corporations, instead of upgrading existing computer systems, competed with each other to order very expensive and highly customized new computer systems. Many corporations ordered customized software in the range of USD 330,000 to USD 500,000.

But the bubble economy was not meant to last forever.

In the fall of 1989, the Ministry of Finance took preemptive action to cool the speculation. The Japanese government began tightening credit. The interest rate charged on loans more than doubled in less than a year. The stock market reacted almost immediately. The Nikkei peaked at close to Yen 40,000 in December 1989, but down to Yen 20,000 by October of 1990. Japan entered a long period of economic doldrums and kept the country in recession throughout most of the 1990s.

When the bubble burst in 1989, the sudden drop in stock prices and the rise in interest rates caused a wave of bankruptcies and NDR was not an exception. The company faced critical problems. Its revenue dropped from Yen 600 million in 1989 to Yen 400 million in 1991 and Yen 350 million in 2004. Likewise, the banks tightened credit lines. The backlog orders dropped almost 50% over a year ago. The average payment terms from clients changed to 90 days from 30 days.

In the long run, however, the aftermath brought additional business chances to the company.

During the bubble economy, NDR received most job orders from large system integrators, not directly from the end-clients, but is merely one of the many subcontractors among giant players.

Since NDR's majority portion of the income relied on subcontracting works, the profit margin was much thinner than its counterparts in the States who are selling prepackaged software and maintenance services.

When the bubble burst, corporations started looking for vendors who could offer less expensive total computer system development. As a result, NDR received more orders directly from the end users. The company was capable of developing hardware and software, and integrating computer systems plus maintenance works internally.

The NDR's "One Stop Solution" was appealing to corporate clients (see Exhibit F, One Stop Solution). By 1993, the average cost of customized software dropped to USD 150,000.

To meet the increasing demand, the company planned to hire more programmers and system engineers. There was, however, a shortage of qualified candidates in the market who fully comprehended new programming languages. The rapid growth of the Internet in the 1990s created an opportunity for new languages to be adopted.

In particular, the Java programming language rose to popularity because of its early integration with the Netscape. Navigator web browser and various scripting languages achieved widespread use in developing customized application for web servers.

Also, around this period in Japan, there were not many technical schools where students can learn the latest languages such as C++, JAVA and HTML (see Table 1- latest programming languages in 1990s). Most engineers who mastered these new languages preferred to join large domestic vendors and American Internet companies for a higher salary and better fringe benefits.

Table 1: Some important languages that were developed in this period include:

- 1990 - Haskell
- 1991 - Python
- 1991 - Visual Basic
- 1991 - HTML (Mark-up Language)
- 1993 - Ruby (developed by Japanese)
- 1993 - Lua
- 1994 - CLOS (part of ANSI Common Lisp)
- 1995 - Java
- 1995 - Delphi (Object Pascal)
- 1995 - JavaScript
- 1995 - PHP

Source: Wikipedia, "History of Programming Language"

To recruit competent software engineers, NDR, as a private equity investor, participated in creating India-Japan Software Engineering Corporation (IJSEC) in 1991. The company was hoping to hire graduates from this institution..

IJSEC conducted training programs in Japanese Language and software development to Indian engineers. Japan international Cooperation Agency (JICA), an agency of Japanese Ministry of International Trade and Industry (MITI) took an initiative to set up IJSEC in Tokyo.

During the bubble economy, it was predicted that Japan would encounter shortages of more than one million software engineers. MITI's intention was to hire Indian system engineers to narrow the demand and supply gap of computer engineers in the domestic software industry.

At that time, India was already recognized as a good source of software engineers. The Indian Government aggressively promoted the education of electronics engineering. Intake capacity of undergraduate engineering colleges increased from 4,788 in 1951 to 45,136 in 1985 and then to 105,000 in 1995.

The Indian software industry was almost non-existent until the late 1980s, but grew at an amazing pace in the early 1990s.

India installed the first computer systems in 1956. In the same year, there were only two nations in Asia who installed computer systems, namely, India and Japan (See Note 1 for India's software business development.)

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**Note 1.**

Aggregate IT software and services revenue (excluding hardware) is estimated to have reached USD 88 billion in 2012 from USD 12.2 billion in 2004.

**Key Highlights**

- Within the global sourcing industry, India was able to increase its market share from 51 per cent in 2009, to 58 per cent in 2011, highlighting India's continued competitiveness and the effectiveness of India-based providers.
  - Export revenues (including Hardware) estimated to reach USD 69.1 billion in 2012 growing by over 16 per cent; Domestic revenues (including Hardware) at about USD 31.7 billion, growing by over 9 per cent
  - The industry continues to be a net employment generator - expected to add 230,000 jobs in FY2012, thus providing direct employment to about 2.8 million (345,000 in 2004), and indirectly employing 8.9 million people
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- As a proportion of national GDP, the sector revenues have grown from 1.2 per cent in FY1998 to an estimated 7.5 per cent in FY2012
- The industry's share of total Indian exports (merchandise plus services) increased from less than 4 per cent in FY1998 to about 25 per cent in FY2012.

Source: NASCCOM, 2012, "Indian IT BPO Industry"

In 1992, Japan International Cooperation Agency (JICA), together with NDR, IJSEC-India was opened in Bangalore, to induce more Indian engineers to study the Japanese Language and software development. During the first 3 years, 54 engineers graduated, although none joined NDR. Almost all joined major Japanese system integrators or foreign computer firms operating in Japan.

IJSEC encountered various problems such as inconsistent teaching method, poor funding management, conflict among the equity investors and miscommunication with local staff. Consequently, IJSEC was forced to shut down the operation in 1997

Although Mr. Nagahara was so disappointed with this result, he did not want to give up recruiting Indian engineers. With his involvement in IJSEC, he was convinced that there would be a huge market potential in India and the hiring of competent Indian engineers would create a stronger growth opportunity for his company.

In 1997, NDR established Nichi-In Software Solutions Pvt. Ltd as a subsidiary to handle Japanese software projects in Banashakari, the southern part of Bangalore City, India.

At that time, the share of Indian software export to Japan was only 3% of the total Indian software exports. Thus, there was a scarcity of IT engineers with Japanese Language skills.

Mr. Nagahara appointed Mr. S. N. Giri as CEO. Mr. Giri had already been with NDR for 8 years, and was fluent in Japanese, plus he had a total 18 years of experience in the IT industry. It was rather unusual for a Japanese company to appoint local

employees to head overseas operation.

Annually, Nichi-In Software Solutions recruited 10 to 15 fresh graduates from technical schools and now had about 70 engineers working in its office in India, with another 32 in Japan.

Nichi-In was increasing its services to Japanese corporate clients, but the percentage of Indian software exports to Japan was shrinking because of the much larger export growth to USA and Europe. During the late 1990s to early 2000s, the software export to USA and Europe grew almost 50% each year.

The company recruitment process provided 11 months of rigorous training in the Japanese Language and technical skills, and the new recruits/trainees are required to attend classes 5 days a week from 9 a.m. to 7.30 p.m.-- 5 hours of language class and 4.5 hours of software skills such as programming, data base handling, Japanese business model, etc. with only 2 hours break.

After classes, the recruits/trainees were required to review daily lessons and also prepare for classes the next day. The important point in the language class is not only to teach the Japanese Language but also to teach Japanese business and social culture. The basic business practices such as “HOURENSOU”, an abbreviation of “Houkoku, Renraku, Soudan” in Japanese, or in English, “reporting, informing, consulting” are quite new to Indian engineers. It seemed too much for them, but usually Japanese clients prefer engineers who are accustomed to the Japanese style of doing business, practice and culture and not the American style.

The company, without earning any revenue from the new recruits/trainees, was spending more than 5% of its annual revenue for the training and salaries of these trainees, composing about one fifth of its total manpower,

Upon completion of the 11-month training period but before working as full-fledged engineers, these trainees are sent to NDR in Japan to go through OJT, the



On-the-Job Training period. Some returned to India after a 3-year assignment in Japan, while the others are headhunted by Japanese and foreign software companies for a much higher salary and fringe benefits.

NDR pays the average salary of Yen 5 million to Yen 7 million to these engineers, while foreign firms operating in Japan offer more than Yen 10 million. While the company recruited almost 250 Indian engineers 1997, two thirds left the company within 2 years. High labor mobility is a common practice in India and also in IT industry. The high turnover of the engineers and the cost of training are the main factors of the poor profitability performance of the company to date (see Table 2. below).

Nevertheless, Mr. Nagahara had no intention to discontinue this policy. Those who remained loyal to NDR stayed with the company and became indispensable assets. Their computer competence level is higher than Japanese engineers. They are well accepted by the Japanese corporate clients, not only because they speak fluent Japanese but they also appreciate Japanese culture more than their Japanese colleagues.

Table 2.NDR Revenue and Operating Profit (in yen) con

<u>Year</u>	<u>Revenue</u>	<u>Operating Profit</u>
2012	713 million	9 million
2011	681 million	7 million
2010	674 million	-1 million
2009	656 million	-3 million
2008	801 million	11 million

Mr. Nagahara was expecting that the NDR presence in India would boost sales like other Indian and foreign software companies operating in India. But contrary to his expectation, the revenue was rather stagnant in the past 5 years, unlike other software vendors with presence in India and catering to American and European corporate clients and whose turnover average was growing more than 20% for the same period.

So far, 100% of NDR clients are Japanese corporations and only 20% from offshore outsourcing service and 70% of the revenue came from regular clients, providing them on-site software and hardware maintenance services. Since Japanese corporations are not used to offshore outsourcing contract, it takes time to develop this type of market in Japan.

Other foreign and domestic software vendors operating in India depend more than 60% of their revenue on US clients. The technical skill of NDR is compatible to those catering to the US market but it is almost impossible for the company to tap US market, with no connection or contact in the States. The next potential target accounts are those Japanese companies operating in India who would require local computer system. There are more than 1000 Japanese manufacturing companies in India and the number is increasing steadily.

In 2010, NDR established NDR Solution Co., Ltd as another subsidiary based in Bangkok, Thailand. The objectives are: 1) to secure more stable and cheaper engineers who will stay with the company longer period; and 2) to capture the local market in Thailand where more than 3000 Japanese companies are operating.

Mr. Nagahara is contemplating to expand its operation to other countries such as China, Malaysia and the Philippines but so far the targeted clients are still Japan and Japanese firms operating in these countries.

**Exhibit A.****NDR COMPANY HISTORY**

1984	Establishment of NDR
1986	Increase of capital to 10 Million Yens
1986	Inauguration of Osaka office in Tennoji-ward
1988	Increase of capital to 20 Million Yens
1990	Increase of capital to 35 Million Yens
1991	Establishment and financial investment for IJSEC with Japanese International Co-operation foundation. Establishment of coalition company called IJSEC-India in India
1992	Establishment of design and development branch in Osaka office
1995	Office integration in Nishi-ward, Osaka
1997	Establishment of Nichi-In Software Solutions Pvt. Ltd., Bangalore, India
1997	Closure of IJSEC-INDIA
2002	Establishment of Tokyo office in Chiyoda-ward
2003	Increase of capital to 40 Million Yens
2003	Increase of capital to 65 Million Yens
2004	Shift of Tokyo office to Bunkyo-ward
2006	Shift of Tokyo office to Sumida-ward
2009	Establishment of Mishima office
2010	Establishment of NDR Solution (Thailand) Co., Ltd, Bangkok, Thailand
2010	Closure of Tokyo office

## **Exhibit B.**

### **NDR Line of Businesses**

#### **SOFTWARE DEVELOPMENT**

##### **Development of Control System Software**

- ✧ Design and Development of Real Time BSP applications for industries and household systems
- ✧ Development of various OS device drivers
- ✧ Development of Firmware for Micro Controller system
- ✧ System Development for SOC

##### **Application Software Development**

- ✧ Design and development of Client/Server applications
- ✧ Design and development of web applications
- ✧ Web enabling of existing Client/Server applications
- ✧ Development of data acquisition systems/device monitoring systems
- ✧ Localization(English --> Japanese), globalization(Japanese --> English) of existing software

##### **Operating System**

- ✧ Linux, Unix, VxWorks, ITRON
- ✧ Windows(2000, XP, Vista)

##### **Development Languages/Tools**

- ✧ C, C++, C#, VC++, VB, ASP, .NET, Java, JSP, SQL, PLSQL, HTML, DDK, WDK etc.,
- ✧ ORACLE, SQL Server, MySQL

## Exhibit C.

### NDR

#### Hardware Development

Undertake design and development of Industrial Hardware consignment.

#### Supported Bus System\*

- PCIbus
- PCI Express
- CompactPCI
- PC104bus
- VMEbus

Also provide support to any other standard specification bus and original bus specified by clients.

#### Supported CPU

- |                         |                           |
|-------------------------|---------------------------|
| ➤ Freescale Corporation | PPC, 68K Series etc.      |
| ➤ Renesas Corporation   | iSH Series, H8Series etc. |
| ➤ AMCC Corporation      | PPC etc.                  |
| ➤ ITI Corporation       | DSP etc.                  |

#### Supported Interfaces

- |                |  |
|----------------|--|
| ➤ Display      | NTSC, analogRGB, DVI etc.                |
| ➤ Commuication | Ethernet, DeviceNet, USB, HOTLink, ARINC |
| ➤ IBUS         | SATA, PATA, SDcard                       |

#### FPGA

Undertake design of FPGA. Provide support tin VHDL, Verlog and also in selection of FPGA supported devices.

\*A **system bus** is a single computer bus that connects the major components of a computer system. The technique was developed to reduce costs and improve modularity. It combines the functions of a **data bus** to carry information, an address busto to determine where it should be sent, and a control busto to determine its operation.

**Exhibit D.****NDR Major Client List**

<u>Client Name</u>	<u>Industry</u>
Mizuho Securities Co., Ltd.	Investment banking
Toshiba Tec Corporation	Computer & internet
Fujitsu Ten Ltd.	Car navigation and audio systems
Nissin Electric Co., Ltd.	Electrical equipment and instruments
Fuji Electronics Co., Ltd.	Induction heating machines
Hitachi Zosen Corporation	Ship building
Mitsubishi Electric Corporation Ltd.	Electrical and electronic products
Hitachi Ltd.	Electrical and electronic products
Daikin Industries Ltd.	Air-conditioning, oil hydraulics
Sumitomo Electric Industries, Ltd.	Automotive, electronics, electric wire
Toyota Industries Corporation	Textile machinery, automobiles, material handling equipment
Kyocera Document Solutions	Printers and copier
Kobe Steel Ltd.	Steel mill
MU Center Service, Osaka	Bank processing center of Mitsubishi-UFJ
OTK Corporation	Welded steel pipe

**Exhibit E.**

**Japan: Top 10 System Integrators' Revenue and Market Share 2006-2007**

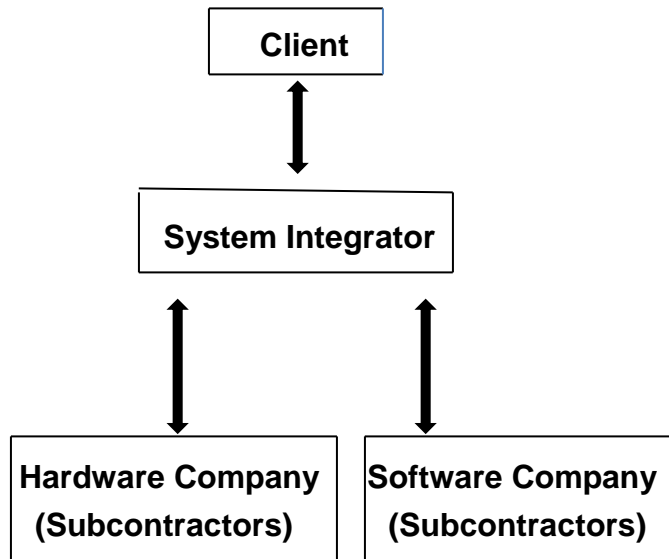
(in millions of dollars)

Rank	Vendor	Revenues 2006	Revenues 2007	Growth (%) 2006--2007	Market Share (%) 2007
1	Fujitsu	4,849	4,938	1.8	15.8
2	NEC	4,146	4,311	4.0	13.8
3	Hitachi	3,668	3,913	6.7	12.5
4	IBM	3,466	3,555	2.6	11.4
5	Nomura Research Institute	1,067	1,220	14.3	3.9
6	NTT Data	1,021	1,052	3.0	3.4
7	Toshiba	987	1,047	6.1	3.3
8	Fuijsoft	986	965	-2.2	3.1
9	Mitsubishi Electric	866	882	1.9	2.8
10	Nihon Unisys	657	858	30.7	2.7
	Other Service Vendors	8,007	8,547	6.8	27.3
	<b>Total Market</b>	<b>29,720</b>	<b>31,289</b>	<b>5.3</b>	<b>100.0</b>

Source: Karlsson, 2008

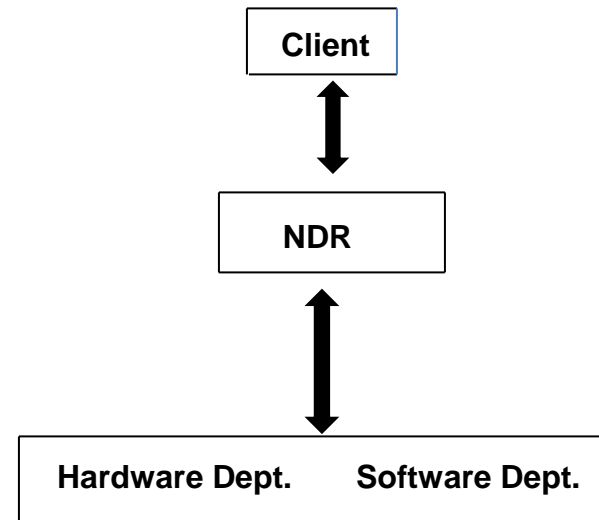
**Exhibit F.**  
**NDR Co., Ltd.**  
**One Stop Solution**

**Normal System Development**



**Delay and increase in communication and adjustment cost plus mark up by subcontractors development**

**NDR One Stop System Development**



**Smooth communication between the two departments, faster total system**

**and less expensive**

**Achieve more efficient and less expensive system development**