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Thailand Information and Communication Technology Market Survey 2007

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จัดทำโดย:

ฝ่ายวิจัยกลยุทธ์และดัชนีอุตสาหกรรม
ศูนย์เทคโนโลยีอิเล็กทรอนิกส์และคอมพิวเตอร์แห่งชาติ
สำนักงานพัฒนาวิทยาศาสตร์และเทคโนโลยีแห่งชาติ
กระทรวงวิทยาศาสตร์และเทคโนโลยี
112 ถนนพหลโยธิน ต.คลองหนึ่ง อ.คลองหลวง จ.ปทุมธานี 12120
โทรศัพท์ 02-564-6900 ต่อ 2362 โทรสาร 02-564-6901-2
เว็บไซต์: http://www.nectec.or.th/srii/ อีเมล์: srii@nnet.nectec.or.th
เขตอุตสาหกรรมซอฟต์แวร์ประเทศไทย
99/31 หมู่ 4 อาคารซอฟแวร์พาร์ค ถนน แจ้งวัฒนะ ตำบล คลองเกลือ อำเภอ ปากเกร็ด จังหวัด นนทบุรี 11120
โทรศัพท์ (662) 583-9992, (662)962-2900 โทรสาร (662) 583-2884
เว็บไซต์: http://www.swpark.or.th
สำนักงานส่งเสริมอุตสาหกรรมซอฟต์แวร์แห่งชาติ (องค์การมหาชน)
89/2 หมู่ 3 อาคาร 9 ชั้น 11 บมจ. ทีโอที ถนนแจ้งวัฒนะ แขวงทุ่งสองห้อง เขตหลักสี่ กรุงเทพฯ 10210
โทรศัพท์ (662) 554-0400 โทรสาร (662)554-0401
เว็บไซต์ http://www.sipa.or.th

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Thailand ICT Market Survey 2007 and Outlook 2008

ICT Market Overview

Software Park Thailand, the National Electronics and Computer Technology Center (NECTEC) and the Software Industry Promotion Agency (SIPA) together with their partners, namely the Association of Thai ICT Industry (ATCI) and the Association of Thai Software Industry (ATSI), have jointly conducted a 2007 market survey on Information and Communication Technology (ICT) market in Thailand. NECTEC was entrusted to conduct the survey on behalf of these alliances.

In 2007, the survey, which follows on from that conducted in 2006, was being carried out under the study project titled “Current Status of Thai Software Industry”. The main objective is to review the current situation of the software industry and to assess the overall value of ICT spending in Thailand. The ICT market targeted in this survey comprises the computer hardware, computer software, and computer services and communications markets. The survey has been conducted during November 2007 to January 2008 using both tele-surveys and in-depth interviews with over 1,800 entrepreneurs throughout the country. In the last stage of the study,main industry players were brought in for a focus group meeting to help verify the numbers and to give comments and perspectives on the study results.

The result of the 2007 market survey, presented in Table 1,revealed that the total Thailand’s ICT spending amounted to USD 15,912 million[1] (537,818 million baht) of which 72.7%, or USD 11,575 million (391,218 million baht), were spent in the communication market. ICT spending in computer hardware, computer software and computer services markets, on the other hand, were lower and accounted for 12.8%, 10.6% and 3.8% of the total ICT spending respectively. The value of computer hardware market was USD 2,033 million (68,719 million baht) while that of computer software market was USD 1,691 million (57,178 million baht) and computer services market was USD 613 million (20,703 million baht). In 2008, the ICT market

[1] The average of three year (2006, 2007 and 2008 (average of the first quarter) exchange rate at 33.80 THB/USD is been used for the entire paper.

is expected to grow 13.1%, where the computer services market is expected to have the highest growth at 26.9%, while computer software is expected to come second, followed by the communications and the computer hardware with growth of 17.6%, 12.9% and 6.8% respectively.

Table 1: Thailand's ICT Market in 2006 - 2007 and Outlook 2008

Market	Value (Mil. USD)			Growth Rate (%)		Market Share (%)		
	2006	2007	2008	06/07	07/08	2006	2007	2008
1.Computer Hardware	1,851	2,033	2,171	9.8	6.8	12.7	12.8	12.1
2.Computer Software	1,481	1,691	1990	14.2	17.6	10.1	10.6	11.1
3.Computer Services	523	613	777	17.0	26.9	3.6	3.8	4.3
4.Communications	10,748	11,575	13,064	7.7	12.9	73.6	72.7	72.6
Total ICT	**14,606**	**15,912**	**18,002**	**9.0**	**13.1**	**100.0**	**100.0**	**100.0**

Remarks: Market scope and definition are presented in "Definition and Methodology" section.

Table 2: Thailand's IT Market in 2006 - 2007 and Outlook 2008

Market	Value (Mil. USD)			Growth Rate (%)		Market Share (%)		
	2006	2007	2008	06/07	07/08	2006	2007	2008
1.Computer Hardware	1,851	2,033	2,171	9.8	6.8	32.5	33.6	31.4
2.Computer Software	1,481	1,691	1,990	14.2	17.6	26.0	28.0	28.7
3.Computer Services	523	613	777	17.0	26.9	9.2	10.1	11.2
4.Data Communication Equipments	1,839	1,714	1,987	-6.8	15.9	32.3	28.3	28.7
Total IT	**5,694**	**6,051**	**6,925**	**6.3**	**14.4**	**100.0**	**100.0**	**100.0**

When focusing solely on the Information Technology (**IT**) market, which consisted of the computer hardware, computer software, computer services and data communication equipments, as shown in Table 2 , it was found that in 2007 the IT market was worth USD 6,051 million (204,535 million baht) representing an increase of approximately 6.3% from 2006. It is expected that in 2008 the IT market will grow by 14.4% to reach USD 6,925 million (234,073 million baht).

In terms of market share, in 2007 the computer hardware market held the highest share in IT market, followed by data communication equipment, computer software and computer services markets with shares of 33.6%, 28.3%, 28.0% and 10.1% respectively. In 2008, the market share is expected to follow the same pattern. However, the share of computer services and software were likely to rise gradually. This reflects an increasing importance of the IT services as Thailand is moving towards a knowledge-based society.

Table 3: ICT Spending 2007 by Economic Sectors

Market	Value (Mil. USD)				Ratio (%)			
	Economic Sectors				Economic Sectors			
	Gov.	Enterprise/ Corporate	Household/ SoHo[1/]	Total	Gov.	Enterprise/ Corporate	Household/ SoHo	Total
1.Computer Hardware	287	591	1,157	2,033	14.1	29.1	56.8	100.0
2.Computer Software	411	1,134	146	1,692	24.3	67.1	8.7	100.0
3.Computer Services	124	467	22	613	20.2	76.2	3.6	100.0
4.Communications [2/]	4,423		7,151	11,575	38.2		61.8	100.0
Total ICT	**7,437**		**8,474**	**15,911**	**46.7**		**53.3**	**100.0**

Remarks: [1/] SoHo = Small Office and Home Office.

[2/] The classification of spending sector in communications market differs from the others, especially in data communication market. There are three groups of spenders in this market which are Enterprise/Corporate, Household/Small office and Home office (SOHO) and Operators. The latter group not only consumes products but re-sells the product or provides the services on the product to the government sector as well as the large enterprise. For this reason, it is difficult to separate the spending in data communication of government sector and enterprise/corporate.

The **ICT** spending in 2007 by economic sectors (Table 3), showed relatively high ICT spending in the household sector, accounting for 53.3% of which 80% is spent in the computer hardware and communications market. The government and enterprise, on the other hand, altogether accounted for 46.7 % of the total ICT spending.

When considering the spending in IT market by economic sectors, (Table 4) in 2007, the government and the enterprise accounted for 77.6% of the IT market, while that from the household sector accounted for only 22.4%. The household sector spent only a small portion (2%) in the data communication equipment market because most of the products in this market are mainly used in office or large network.

Table 4: The IT Spending 2007 by Economic Sectors

Market	Value (Mil. USD)				Ratio (%)			
	Economic Sectors				Economic Sectors			
	Gov.	Enterprise/ Corporate	Household/ SoHo[1/]	Total	Gov.	Enterprise/ Corporate	Household/ SoHo	Total
1.Computer Hardware	287	591	1,157	2,033	14.1	29.1	56.8	100.0
2.Computer Software	411	1,134	146	1,692	24.3	67.1	8.7	100.0
3.Computer Services	124	467	22	613	20.2	76.2	3.6	100.0
4.Data Communications[1/]	1,680		34	1,714	98.0		2.0	100.0
Total IT	**4,635**		**1,357**	**6,051**	**77.6**		**22.4**	**100.0**

Remarks: [1/] The communications market, especially data communication equipment, is classified differently from other markets. In this market, consumers are classified into three different groups, namely enterprise/corporate, household/small office and home office (SoHo) and operators. However,some operators do both selling the products/services to the government and using the products in their own operationm thereby,making it difficult to separate the government sector's spending from the enterprise/corporate's spending.

The detail of the survey in each market can be summarized as follows:

Computer Hardware

In the 2007 survey of the computer hardware market, some adjustments have been made on market classification to keep pace with technological changes.This year; the PC Server was classified under the Small Scale System category whereas in 2006, it was under total PC category. In the Special Purpose Equipment category, the 2006 survey covered only the value of computers installed in ATM machines, this year ,the coverage expanded to cover the POS System. Lastly, the mini notebook was added to the notebook market, whereas the PDA has been moved to communications market by putting in PDA Phones categories.

The result of the survey (Table 5) revealed that in 2007 the computer hardware market was worth USD 2,033 million (68,719 million baht), representing a 10% growth from the preceding year. Some 60 % of the computer hardware market comes from the sales of desktop PC and notebook.This could be attributed to affordable pricing and the fact that computers have become an important necessity for consumers at all level. In addition, a rapid technological change in the computer hardware has also caused virtually price drop in all products, almost every year. Therefore, evaluating the size of the market in terms of value would not reflect the real situation of the market. In this regard, the assessment in terms of sales in volume and growth would provide a clearer picture.

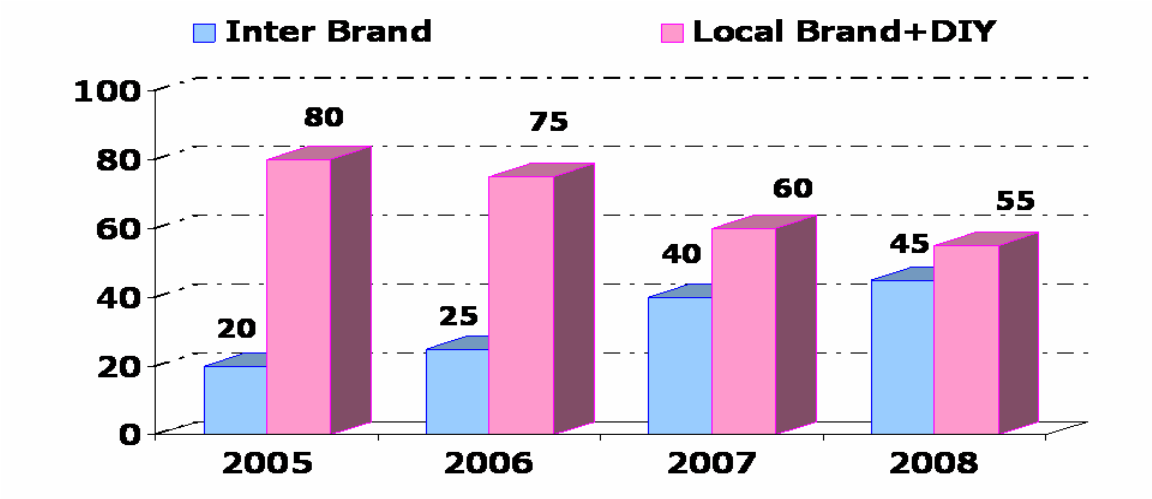
The most remarkable changes in this market in 2007 were the growth of notebook computer sales, the shrinking of the CRT monitor market, an increase in sales of All- in-One Inkjet printers and growth in the value of the external data storage market.

Table 5: Value of Computer Hardware Market 2006 – 2008

Catagories	2006			2007					2008				
	Unit	Avg. Price (US$)	Value (Mil. US$)	Unit	Avg. Price (US$)	Value (Mil. US$)	YTY (%) in Quantity	YTY (%) in Value	Unit	Avg. Price (US$)	Value (Mil. US$)	YTY (%) in Quantity	YTY (%) in Value
1 System	**n.a.**	**n.a.**	**226**	**n.a.**	**n.a.**	**250**	**n.a.**	**10.5**	**n.a.**	**n.a.**	**279**	**n.a.**	**10.0**
1.1 Large scale systems	n.a.	n.a.	39	n.a.	n.a.	28	n.a.	n.a.	n.a.	n.a.	31	n.a.	10.0
1.2 Medium scale systems	n.a.	n.a.	21	n.a.	n.a.	62	n.a.	n.a.	n.a.	n.a.	71	n.a.	15.0
1.3 Small scale systems	n.a.	n.a.	153	n.a.	n.a.	102	n.a.	n.a.	n.a.	n.a.	118	n.a.	15.0
1.4 Special Purpose Equipment	n.a.	n.a.	13	n.a.	n.a.	58	n.a.	n.a.	n.a.	n.a.	59	n.a.	2.1
2 PC & Peripherals	**n.a.**	**n.a.**	**1,625**	**n.a.**	**n.a.**	**1,783**	**n.a.**	**9.7**	**n.a.**	**n.a.**	**1,892**	**n.a.**	**6.1**
2.1 Total PC	**1,600,000**	**n.a.**	**1,051**	**1,980,000**	**n.a.**	**1,194**	**23.8**	**13.6**	**2,208,000**	**n.a.**	**1,277**	**11.5**	**7.0**
2.1.1 Desktop PC	1,100,000	552	607	1,200,000	518	621	9.1	2.3	1,200,000	518	621	0.0	0.0
2.1.2 Traditional Notebook	500,000	888	444	770,000	740	570	54.0	28.3	924,000	680	629	20.0	10.4
2.1.3 Mini Notebook	n.a.	n.a.	n.a.	10,000	352	4	n.a.	n.a.	84,000	325	27	740.0	676.5
2.2 Monitor	**500,000**	**n.a.**	**87**	**264,500**	**n.a.**	**44**	**-47.1**	**-49.0**	**244,000**	**n.a.**	**43**	**-7.8**	**-2.6**
2.2.1 CRT	200,000	104	21	52,500	95	5	-73.8	-76.0	0	0	0	0.0	0.0
2.2.2 LCD	300,000	222	67	212,000	186	40	-29.3	-40.6	244,000	178	43	15.1	9.6
2.3 Printer	**1,106,500**	**n.a.**	**140**	**1,359,000**	**n.a.**	**148**	**22.8**	**5.3**	**1,415,750**	**n.a.**	**146**	**4.2**	**-1.2**
2.3.1 Impacted	52,000	429	22	75,000	370	28	44.2	24.3	71,250	370	26	-5.0	-5.0
2.3.2 Inkjet	850,000	n.a.	79	1,050,000	n.a.	80	23.5	0.9	1,092,500	n.a.	78	4.0	-3.2
2.3.2.1 Single Inkjet	510,000	74	38	550,000	65	36	7.8	-5.1	467,500	59	28	-15.0	-22.7
2.3.2.2 All in One Inkjet	340,000	123	42	500,000	89	44	47.1	6.3	625,000	80	50	25.0	12.5
2.3.3 Laser	204,500	n.a.	39	234,000	n.a.	40	14.4	3.2	252,000	n.a.	42	7.7	5.5
2.3.3.1 Single Laser	163,800	151	25	190,000	142	27	16.0	9.2	203,500	139	28	7.1	4.9
2.3.3.2 All in One Laser	40,700	339	14	44,000	290	13	8.1	-7.5	48,500	281	14	10.2	6.9
2.4 External Data Storage	**n.a.**	**n.a.**	**103**	**n.a.**	**n.a.**	**127**	**n.a.**	**23.9**	**n.a.**	**n.a.**	**152**	**n.a.**	**20.0**
2.4.1 External Hard Disk	n.a.	n.a.	51	n.a.	n.a.	53	n.a.	4.5	n.a.	n.a.	65	n.a.	22.7
2.4.2 Enterprise Storage	n.a.	n.a.	52	n.a.	n.a.	74	n.a.	42.9	n.a.	n.a.	87	n.a.	18.0
2.4.2.1 Entry Level	n.a.	n.a.	22	n.a.	n.a.	30	n.a.	33.3	n.a.	n.a.	34	n.a.	15.0
2.4.2.2 Hi-End Level	n.a.	n.a.	30	n.a.	n.a.	44	n.a.	50.0	n.a.	n.a.	53	n.a.	20.0
2.5 Other Peripherals	**838,600**	**n.a.**	**244**	**880,000**	**n.a.**	**269**	**n.a.**	**10.5**	**934,400**	**n.a.**	**273**	**n.a.**	**1.5**
2.5.1 Scanner	20,000	108	2	24,000	148	4	20.0	64.4	20,400	148	3	-15.0	-15.0
2.5.2 Digital Camera	800,000	296	237	850,000	311	264	6.3	11.6	910,000	296	269	7.1	2.0
2.5.3 PDA	18,600	266	5	6,000	296	2	-67.7	-64.2	4,000	266	1	-33.3	-40.0
Total Hardware Market	**n.a.**	**n.a.**	**1,851**	**n.a.**	**n.a.**	**2,033**	**n.a.**	**9.8**	**n.a.**	**n.a.**	**2,171**	**n.a.**	**6.8**

Sources: From in-depth interview and focus group meeting with key industry players on 4th March 2008

Figure 1: The Ratio of Sale Volume: International Brand PC vs. Local Brand PC + DIY (2005-2008)



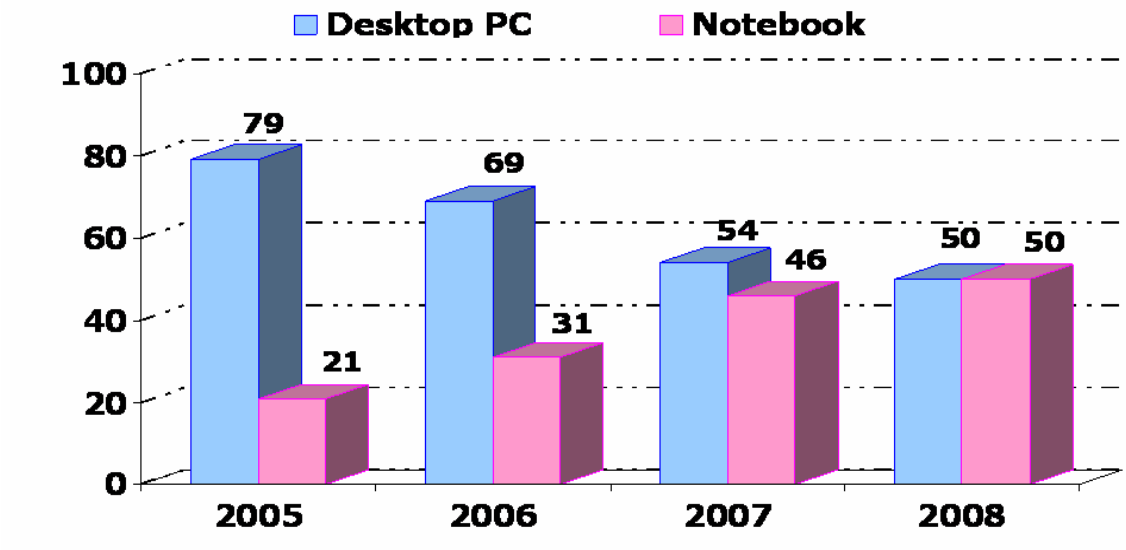
The survey also revealed that the gap between sales volume of international brand PCs and Local Brand PCs (including do-it-yourself (DIY) computers) has came closer (Figure 1). In 2005 the ratio of unit sales was 20:80, and was changed to 25:75, 40:60 and (estimated) 45:55, in 2006, 2007 and 2008 respectively. This suggests that at present, more consumers could afford international brand PCs due to a smaller price gap between the inter brand and local brand PCs. As for the notebook computer market, it was found that in 2007 traditional notebook sales grew by over 50% from the preceding year, with a record of 770,000 units sold. This was resulted from price reductions by both distributors and manufacturers. In 2006 the average price for notebook computers was USD 888 (30,000 baht) per unit, while in 2007 the average price dropped down to USD 740 (25,000 baht) per unit. The change in price and performance of the notebook computer vs PCs over year has led to consumers' behavioral changes. Increasingly, consumers have switched from purchasing desktop computers to notebook computers as their first computers because there is not much price difference between PC and notebook. Furthermore, the price-performance ratio of both notebook computers and desktop computers came close.

In addition, notebook computers have begun to gain attention from comsumers in educational sector. Presently, there are an increasing number of students with their own notebook computer. Furthermore, some universities have even made notebook computers part of teaching and learning equipment and bundled them into student's registration package. This resulted in a dramatic increase in the sales of notebook computers in 2007.

In 2008 the traditional notebook computer market is forecasted to grow by only 20% from the preceding year, a slowdown on the growth shown in 2007. The market is expected to be taken over by mini notebooks which cost approximately 50% of the traditional notebooks, even though its performance is lesser. This mini notebook is more appealed to students with limited budget and/or those who need a less sophisticated computer.

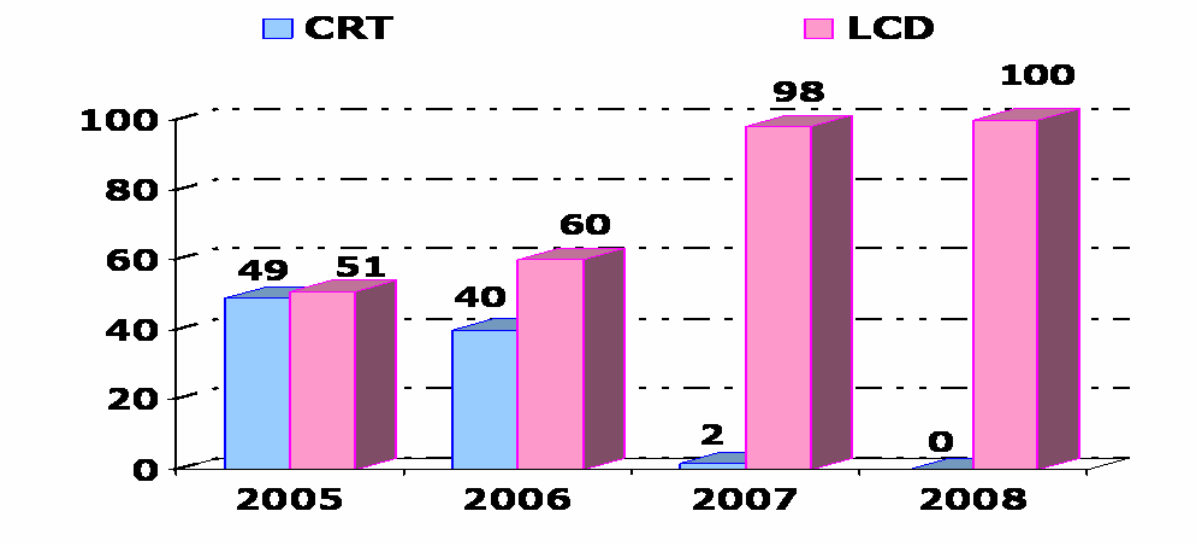
Apart from a relatively high growth rate in the notebook computer market, the sales ratio of desktop computers and notebook computers become closer. In 2005 the sales ratio of desktop computers and notebook computers was 79:21.This was dropped to 69:71, 54:46 and (estimated) 50:50, in 2006, 2007 and 2008 respectively (Figure 2).

Figure 2: Computer Desktop and Computer Notebook Sales Ratio (2005 - 2008)



For the monitor market, it was found that in 2007 the growth rate in the CRT monitor declined dramatically. Only 52,500 units of CRT monitor were sold, respectively approximately 74% dropped from the preceding year. It is expected that this type of monitor will slowly disappear from the market because suppliers are to cease CRT monitors and switch to produce the LCD monitor instead. This was evidenced by the ratio of CRT and LCD sales recorded between 2005 and 2007, starting off with 49:51 for CTR and LCD sales and dropping to 40:60 in 2006 and 2:98 in 2007.It is expected that CRT monitor sales will decline further to the point where they completely lose their share in the market to LCD in 2008 (Figure 3).

Figure 3: Ratio of Sale (Volume) of Monitor: CRT and LCD in 2005 - 2008



As for the printer market, the survey revealed that 1,359,000 units of printers were sold in 2007, which accounted for a 23% growth rate in terms of quantity. Of those units sold over 70% came from Inkjet and All-In-One Inkjet printers. The key factor was the booming digital camera market that stimulated growth in the printer market. The digital camera technology enables users to edit and print the photos at home which is more convenient and cost savings than having them done at studios.

The growing concern about the copyright and privacy violation of the original images also is another factor that make users prefer to manage their own photos and thereby, pushing the Inkjet printer market to grow even further in 2007.

In the inkjet printer market, there was rivalry between the two different sub-categories - Single Inkjet and All-In-One Inkjet. In 2007, Single Inkjet printer sales grew by over 8% while All-In-One Inkjet printer sales went up by 47%, due to the fact that there was only little difference in price between the two. In 2007 the average price for a Single Inkjet printer was USD 65 (2,200 baht) while that for an All-In-One Inkjet printer was USD 89 (3,000 baht). For this reason, the sales trends for these two types of printers are likely to diverge even further. It is expected that in 2008 the Single Inkjet printer's growth rate will decline to only 15% while the All-In-One Inkjet printer will enjoy a 25% increase in terms of quantity.

For external data storage, the 2007 survey found that the value of this market was USD 127 million (4,295 million baht), a 24% increase over the preceding year. Of which over 50% came from enterprise storage sales. The main reason was that many entrepreneurs, especially those in the private sector such as banking, finance and telecommunications businesses, etc, required additional space to store data and, as a result, need to purchase more storage capacity. Furthermore, following the Computer-Related Crime Act 2007, which came into force on 18th July 2007, service providers, such as internet service providers (ISPs) and telecom companies are required to collect and keep their client traffic data for a minimum of 90 days. Such measures have also contributed to a steady growth in the storage market.

The value of computer hardware spending in 2007 showed that the Small Office and Home Office (SoHo) held the highest spending record in this market, amounting to USD 1,156 million (39,062 million baht) and accounting for 57% of the market (Table 6). The enterprise sector was the second highest spender, with USD 591 million (19,969 million baht) in value or a 29% share of the market. The government sector came the third with spending of USD 287 million (9,688 million baht) representing a 14% share.

Table 6: Computer Hardware Spending in 2007 by Economic Sectors

Value in Million USD

Catagories		SOHO		Enterprise		Government		Total
		Ratio	Value	Ratio	Value	Ratio	Value	
1	System	21	53	57	143	22	55	250
2	Desktop PC	55	342	30	186	15	93	621
3	Notebook	65	373	25	144	10	57	574
4	Monitor	80	35	15	7	5	2	44
5	Printer	60	89	25	37	15	22	148
6	External Data Storage	n.a.	51	n.a.	46	n.a.	30	127
	External Harddisk	90	48	10	5	n.a.	n.a.	53
	Hi-end level/Entry level	5	4	55	41	40	30	74
7	Scanner	10	0	70	3	20	1	4
8	Digital Camera	80	211	10	26	10	26	264
9	PDA	95	2	5	0	n.a.	n.a.	2
Total Hardware Market Value*		57	1,156	29	591	14	287	2,034

Source: From in-depth interviews and focus group meeting with key industry players on 4th March 2008

Positive factors that are expected to drive the computer hardware market in 2008 are:

- A democratic government following the general election will help regain trust and confidence from business enterprise and individuals. Government Mega Projects which were delayed or suspended are expected to resume;
- IT products have become necessities for both household and enterprise sectors at all levels;
- The enterprise sector realizes the importance of IT in reducing operational costs and increasing business competitiveness;
- The enforcement of the Computer-Related Crime Act 2007 results in a steady growth in the Storage market;

- Fierce price competition helps consumers make decision on buying a computer easier and quicker;
- The strong value of the baht results in a comparatively lower price of imported products;
- Thailand still holds a rather low computer penetration[2]: only 11.6 computers per 100 persons,so there are rooms for growth
- The new income tax scheme[3] proposed to raise the lower tax threshold and to help socially disadvantaged persons, by increasing the amount of net income exempt from tax from USD 2,960 to USD 4,440 (100,000 baht to 150,000 baht) to stimulate spending in the household sector (approved by the Cabinet on 4th March 2008);
- A revised taxation scheme[4] (approved by the Cabinet on 4th March 2008). to boost investment and raise the enterprise sector's competitiveness: This new tax scheme offers companies or legal entities gain more benefit when investing in software, by allowing them to deduct the depreciation cost of assets classified under computer software within three financial cycles, instead of 10 financial cycles as formerly practiced. The SMEs (companies or registered partnerships with permanent assets, excluding land property, under USD 5.92 million (200 million baht) and with less than 200 employees), are allowed to deduct up to 40% immediately in the first year, and the rest can be deducted within three financial cycles.

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[2] The statistic presented is calculated based on units sold of desktop and notebook computers from 2003 to 2007 survey (source: ATCI & NECTEC).Total PC and notebook were 7,320,700 units, divided by the population 63,038,247 persons (in 2007). (Source: the Department of Provincial Administration, Interior Ministry)

[3] "Green light for economic boost and recovery taxation scheme", Thairath published on 4th March 2008.

[4] "Green light for economic boost and recovery taxation scheme", Thairath published on 4th March 2008.

Negative factors that may hinder the growth of the computer hardware market in 2008 are:

- The continuous rise in oil prices resulting in higher production costs, as oil is still the key production factor;
- Rising inflation, causing and increase in higher costs of factor of production.

Technological trends:

- Virtualization technology which would affect server and data storage categories;
- Entrepreneurs are more aware of the need for the development of energy saving and environmental friendly products;
- The architectural development of the computer 45 - nanometer chip technology and the Quad Core for higher computer efficiency and compatible multimedia functions;
- Digital Home Entertainment resulting from the merger of IT equipment and electronic appliances.
- The Organic Light Emitting Diode which will soon replace the LCD due to its better performance,i.e, approximately 20% more energy saving and providing brighter screen.

Computer Software

The computer software market in 2007 was worth USD 1,691 million (57,178 million baht) in value with a 14.2% growth rate, as shown in Table 7. Considering the market by software category, it was found that enterprise software held the highest market value of USD 1,515 million (51,215 million baht), representing a growth of approximately 13.4% from the preceding year. Mobile Application came second with USD 61 million (2,057 million baht) in value, representing 24.5% growth, followed by embedded software with USD 57 million (1,934 million baht) in value with 30.7% growth.

Table 7: Value of Computer Software Market 2006 - 2008

Categories	Value (Mil. USD)			YTY Growth (%)		Ratio (%)	
	2006	2007	2008	06/07	07/08	2007	2008
1.Enterprise Software 1/	1,336	1,515	1,761	13.4	16.2	89.7	82.8
2.Mobile Application 2/	49	61	83	24.5	36.1	3.6	3.9
3.Embedded Software	44	57	80	30.7	39.0	3.4	3.7
4.Others 3/	52	58	66	11.8	13.6	3.5	3.1
Total 4/	**1,481**	**1,691**	**2,127**	**14.1**	**17.6**	**100.0**	**100.0**

Remarks:

1/ This includes three groups of software, which are System/Infrastructure (such as OS/Utilities), Middleware (such as Database Middleware, Transaction Processing monitor (TP), Messaging-and-queuing), Applications (such as CRM, HRM, Accounting)

2/ Business and Entertainment Applications

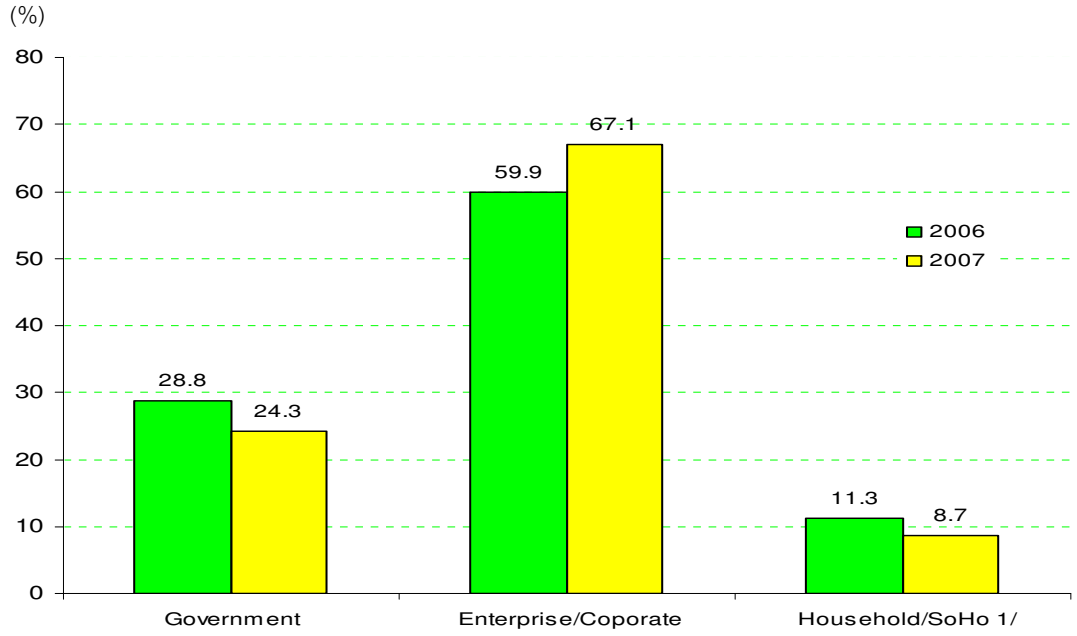
3/ e-Learning, CAD/CAM, Games (excluding online games)

4/ The number is rounded up

Spending in the computer software market in 2007 by economic sectors in Figure 4 showed that the enterprise sector was still the largest spender in the software market, with 67.1% share or USD 1,134 million (38,338 million baht) in value. The second highest was the government sector with a 24.3% share, worth USD 411 million (13,894 million baht), followed by the household sector, with 8.7%

share or USD 146 million (4,946 million baht). Government and household spending have dropped from the preceding year by 3.7% and 12.2% respectively. This may be due to the delay in government budget approving process in the first three quarters of the year, and the economic instability, respectively.

Figure 4: Computer Software Spending by Economic Sectors in 2006 - 2007



Remarks: 1/ Small office and Home office

The driving force that has pushed the software market to flourish in 2007 came from clients in the enterprise sector who need technology to enhance the efficiency of their operation and improve the quality of services. For example, financial businesses have expanded their services to cover new services on mobile application. These businesses started promoting these kind services in late 2007, with such major features as: (1) financial inquiries via SMS (2) mobile payment for goods and services offered by businesses that registered with the bank. The IT upgrading in banking and financial institutions to meet the risk management and security systems required by the Bank of Thailand's decree (Basel II) also contributed to the growth of software market. A decrease in the price of computer hardware and subsequent in an increase in purchases of computers turned to be a positive driving factor for the software market as well.

The software market trend for 2008 is likely to grow by 17.6%, valued at USD 2,127 million (67,262 million baht). The highest growth of which will be in the embedded software of which is forecasted to grow by 39% to reach USD 80 million (2,688 million baht) in value.

Factors driving the software market to grow in 2008 are as follows:

- The elected democratic government: The government is likely to pursue an IT market promotion campaign and to stimulate the economy by investing more on mega projects such as the Mass Rapid Transit project (MRT), the e-Government project, Data Interchange for the logistic management of products and services[5], which will benefit both the software and hardware markets.

- The tendency that the medium-and large-sized enterprises will make more use of software in managing their businesses and purchase licensed software. The businesses start to realize the severity of copyright infringement issues and more stringent enforment of copyright law.

- Small and Medium-Sized Enterprises (SMEs)[6] are expanding. These small companies are run by new generation, and open-minded managers who recognize the importance of an IT system. They are likely to use IT and websites to enhance business performance.

- Tax scheme[7] to boost investment and enhance the country's competitiveness; for example the tax incentives scheme which allows companies to deduct the depreciation cost of assets classified under computer programs sooner - within three financial cycles, instead of 10 financial cycles as formerly

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[5] Information obtained from the cabinet's policy announcement to Parliament on 18th February 2008.

[6] In 2006 there were around 2.3 million SMEs in Thailand, with an average growth rate of 1.5% (source: Office of Small and Medium Enterprises Promotion).

[7] The taxation scheme is called: "Returning money to your pocket for economic boost project". (source: www.rd.go.th)

practiced. For SMEs, up to 40% of the cost can be deducted immediately as its depreciation cost and the rest can be deducted within three financial cycles. This scheme is expected to stimulate an investment in IT, includingly software purchases.

- An increase in the usage of mobile phones, a wider variety of services, with new applications[8], and an improved functionality of mobile phones that allows customers to use more enterprise applications.

- The government promotion for businesses to utilize the embedded system more in the manufacturing, especially in the automotive industry: multinational companies have invested in setting up the embedded system specialization center to support the production and development of embedded software to be used in electrical applicances since 2006, as well as starting to train and build up human resources to meet future demands. These activities are expected to be fully and comprehensively implemented in 2008.

As for technological trends, in the near term, the technologies that are likely to come soon and would affect the software market are

- Service Oriented Architecture (SOA) Technology, which is an architectural style allowing different applications to exchange data and participate in business processes. These functions are loosely coupled with the operating systems and programming languages underlying the applications which will then increase flexibilities for the system to cope with the rapid change of business process;

- Software-as-a-Service (Saas) technology or Software Plus Services, which is a software application delivery model where a software vendor develops a web-native software application and hosts and operates (either independently or through a third-party) the application for use by its customers over the

[8] The mobile phone penetration reported by National Statistical Office during 2006 – 2007 has increased. The mobile penetration rates are 41.6% (25 million mobile users) and 47.2% (28 million users) respectively..

Internet. Customers do not pay for owning the software itself but rather for using.This will provides a more cost-effective alternative for enterprises to achieve their business objectives than traditional packaged applications.

- Convergence Technology, especially the Internet, broadcasting and mobile phone technologies, will made available a greater variety of functions such as the mobile internet application[9]. An example of technologies that would affect the local market in the short term is the Location Based Service which can be applied to various activities such as locating destinations, journey, planning, or tracking merchandise vehicles;

- Embedded Sensors Technology, which is soon to be developed for local industrial use, for example, as part of an environmental change detector in a car, measuring the temperature and setting automatic functions;

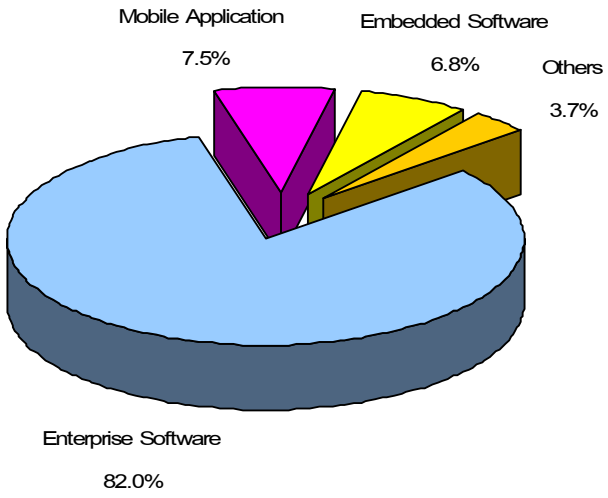
- Web 2.0 Technology, which is the technology that enhances the currently popular social community network, equipped with various applications such as Podcast, Videocast, Blog, Wiki or Social bookmark and is also expected to be applied in business, thus more supporting software is anticipated.

The Status of Thai Software Industry

The 2007 Software Market Survey found that there were 1,300 establishments in the software industry. As presented in Figure 5, most of these establishments were mainly in the Enterprise Software Business (82%) followed by the Mobile Application (7.5%), and the Embedded Software (6.8%). Most establishments are Thai nationals,with 91% having 100 % Thai sharedolers and the remaining 9 % has some proportion of foreign shareholders.

[9] The emerging of new mobile application development technology platform, Andriod, is expected to make a new wave in the mobile application regime in the next 2-3 years.

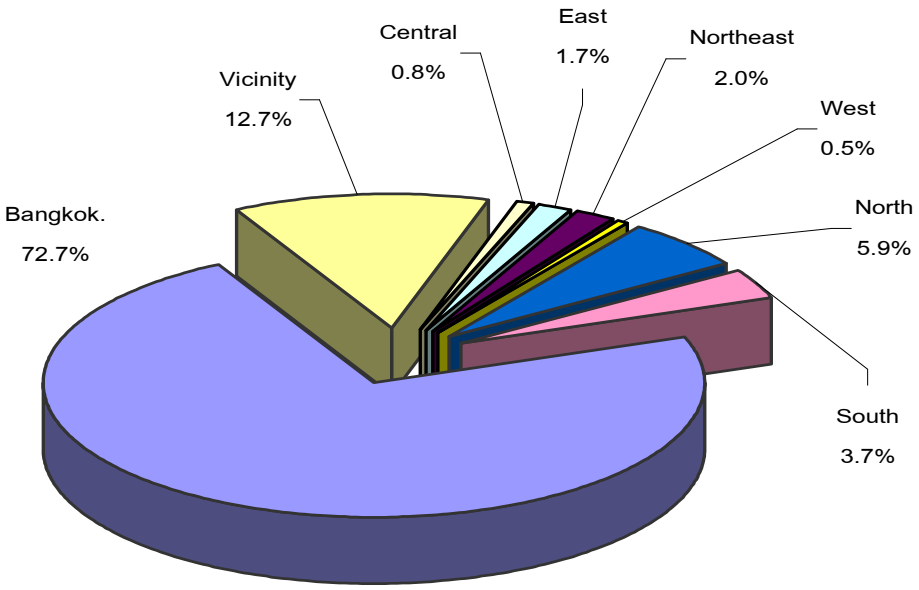
Figure 5: Software Business by Type of Software in 2007



Remarks: From 403 respondents

Considering the location of business, most of these establishments (72.7%) were situated in Bangkok, followed by the vicinity[10] area (12.7%), and the North (5.9%), as shown in Figure 6.

Figure 6: Software Business by Location

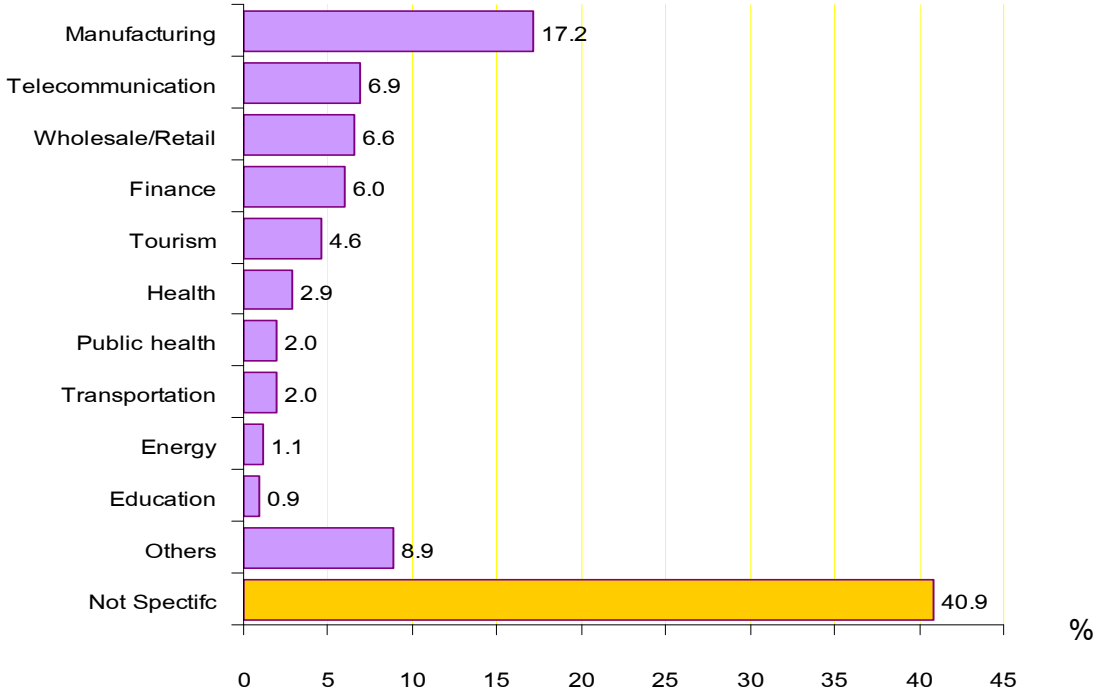


Remarks: From 403 respondents

[10] The vicinity area includes Samuitprakarn, Phatum Thani, Samuisakorn, Nakhon Pathom, and Nonthaburi provinces.

In terms of software specialization as shown in Figure 7, it was found that most of software businessed in Thailand offered various types of software and did not limit their specializtion in any specific area. Focusing on single area was likely perceived to be risk for the business, since the need in a particular vertical market is quite limited. Therefore, the software businesses diversify themselves by offering wide range of products in order to survive. From the survey, we found that found that, 40.9% of software business did not declare area of specialization[11], while 17.2% stated their specialization in software for manufacturing, 6.9% specialized in software for telecommunication and communication, and 6.6% in software for wholesale and retail.

Figure 7: Areas of Specialization of Software Business in 2007

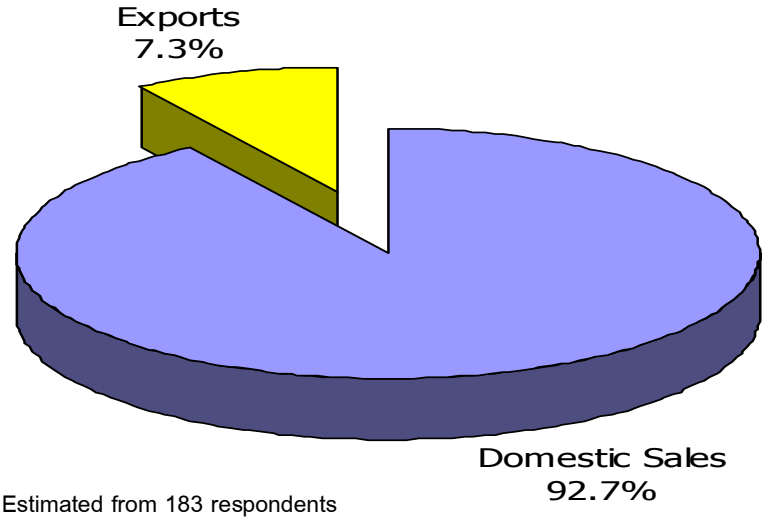


Remarks: From 183 respondents

[11] The specialization has been identified by source of revenue. Source that contributes more than 70 percent of the over all revenue will be identified as areas of specialization.

Regarding the presence in the international market in 2007, the survey revealed the proportion of export vs domestic market to be approximately 7:93[12] (Figure 8), with a value of exported software amounted to USD 124 million (4,200 million baht). The main trade partners are Japan, USA, Vietnam, and Singapore. The oversea market is still limited due to the lack of marketing skills and lack of information about the market within the export software market, the embedded software has the highest export proportion (11.3%) as shown in Figure 9.

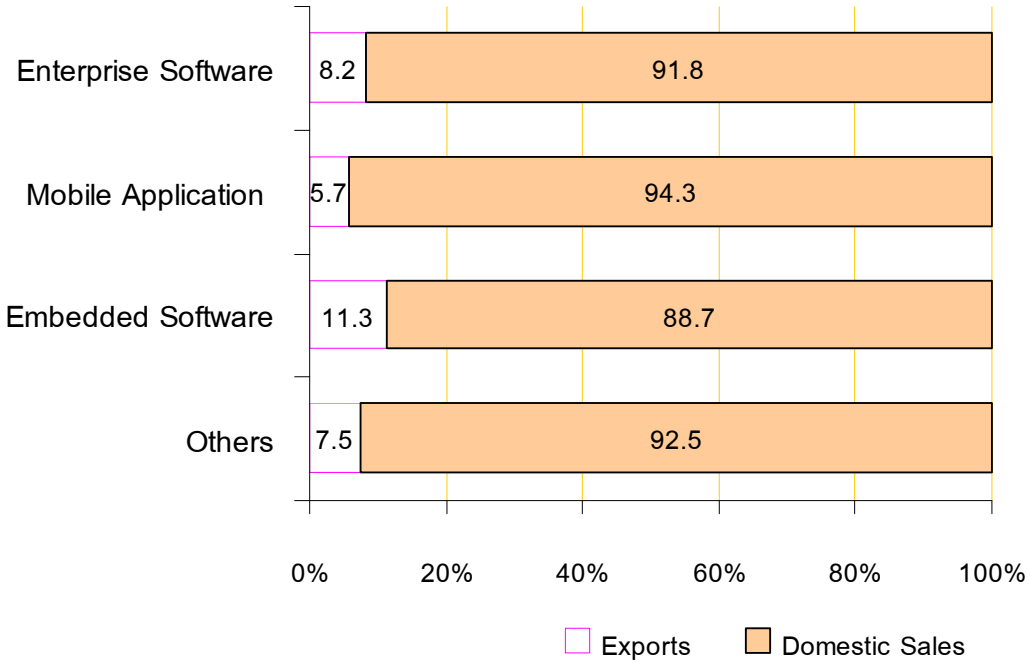
Figure 8: Proportion of the Sales of Software in Domestic vs. Export Market in 2007



Remarks: Estimated from 183 respondents

[12] This market is viewed from supply side perspective to reflect where the products/services are sold for, domestic or oversea market.

Figure 9: Proportion of Domestic Software Market and Export Market by Type of Software in 2007



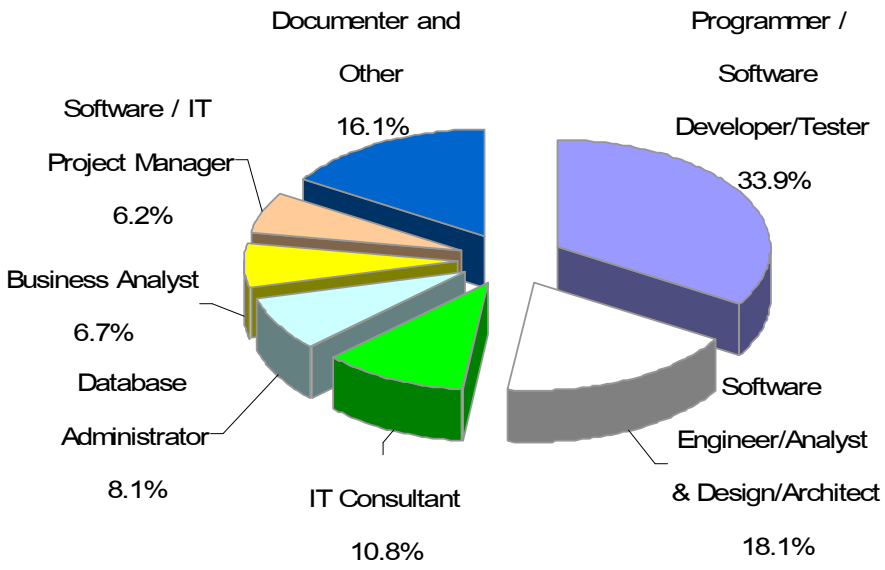
Remarks: Estimated from 206 respondents

In terms of employment, in 2007 the industry has employed 49,770 personnels, of which 83.6% or 41,620 are technicians (Table 8). Most of these (33.9%) are programmers or software developers. Those in the position of Software Engineer, System Ananyst & Design or Software Architect are the second highest, accounting for 18.1% of all employees. The other 10.8% are in IT Consultant position. Most employees hold a bachelor's degree.

Table 8: Software Personnel in Thai Software Industry in 2007

Type of Staffs	Number(Persons)	Ratio (%)
Technical Staff	41,620	83.6
Non-technical Staff	8,150	16.4
Total	**49,770**	**100.0**

Figure 10: **Proportion of Software Technical Staffs by Position**

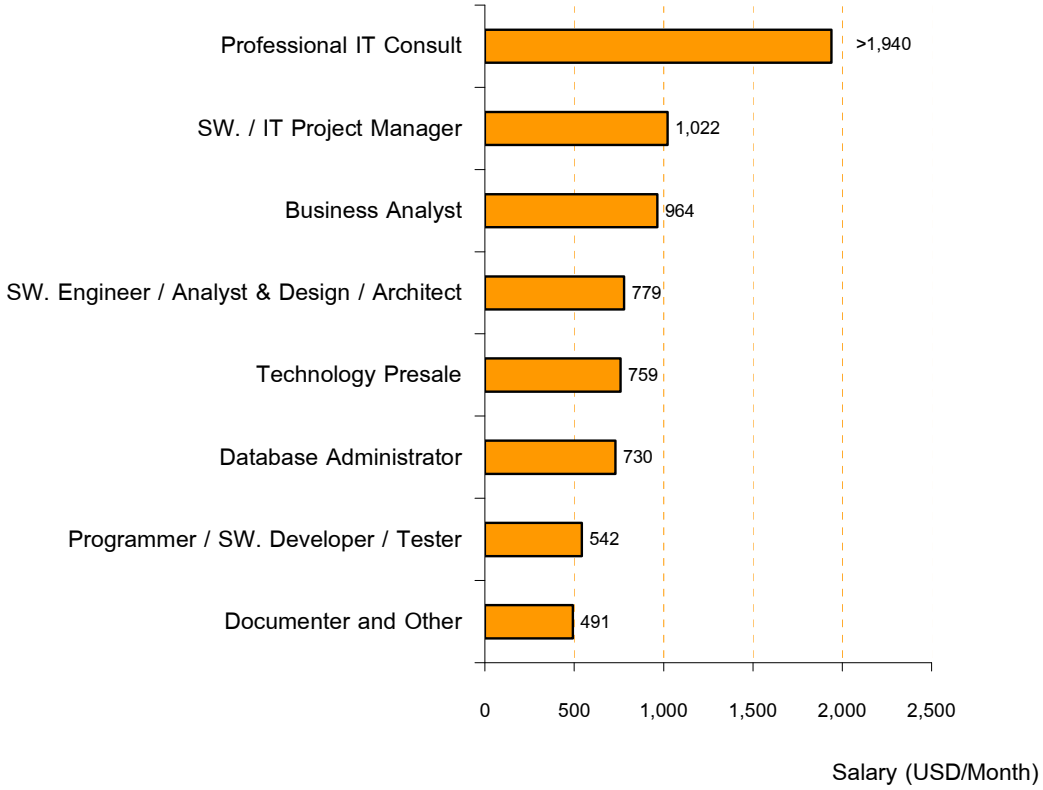


Remarks: Estimated from 397 respondents

According to interviews, staff in IT Consultancy can be divided into two sub-categories: Professional IT Consultants and Technology Presales, accounting for 1.8% and 9% of the total employment in the technical field respectively. Those in Professional IT Consultancy have the highest average salary of over USD 1,940 per month[13] (65,625 baht per month), followed by Software or IT Project Managers, with a salary of USD 1,022 per month (34,577 baht) and Business Analyst group with a salary of USD 964 per month (32,628 baht per month). (Figure 11)

[13] In some projects, the IT consultants earn more than USD 2,979 a month (100,000 baht), depending on size and type of the projects as well as the project responsibilities.

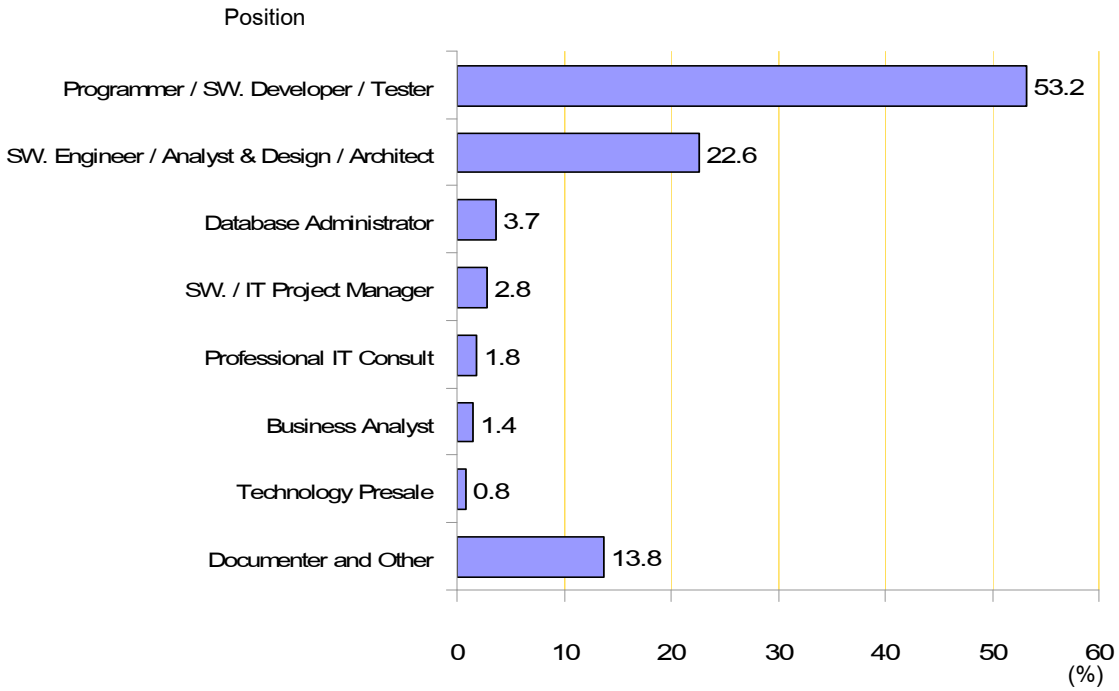
Figure 11: Average Monthly Salary of Technical Staffs by Position 2007



Remarks: Estimated form 295 respondents

Thai software industry is currently suffering from a staff shortage which becomes a serious hindrance on business expansion. For the demand side, it is estimated that in 2009 the industry will need 6,060 additional employees. As show in Figure 12, programmers is most needed, followed by software developers and quality controllers which altogether accounting for more 50% of the market. The second most needed are software engineers, software analysts & designers, accounting for 22.6% and another 3.7% for database administrators. Other positions that are also high need are graphic designers, web designers and network engineers.

Figure 12: Demand for Software Technical Staffs in 2009



Remarks: Estimated from 254 respondents

Challenges and barriers faced by the software industry in 2007 can be summarized as follows:

1. Personnel issues: the industry suffers from personnel shortages, both in terms of quantity and quality, especially in the area of software development which poses a major threat to business growth because the software industry relies heavily on personnel. This also affects the opportunity to attract foreign investment. The entrepreneurs believe that this problem is caused by: (1) new generation workforce are likely to seek for high salary rather than the gain in experience and skills, resulting in ignoring lower paid jobs and lack of patience and determination to accomplish their present jobs and duties; (2) educational institutes producing graduates whose knowledge does not comply with the current requirements of the industry. The newly graduates cannot apply their knowledge to real-life situations in the work place. Besides, technical staffs often lack some needed skills such as management and business project planning which are crucial for handling large scale projects.

The businesses would like to see the government provide assistance in developing standardized curriculum at higher education level, particularly, the improvement in engineering and programming courses by adding some knowledge in business administration, marketing and economics, to the regular technical curriculum. This is to equip the graduates with an awareness of business process thinking. Furthermore, the universities should allow students to take extra curricular courses so that students acquire knowledge and skills to meet the demands of the industry and keep pace with the fast changing technologies.

2. Challenges within the domestic market: Thai software businesses indicated that software developed by Thais was not recognized or well-received in the market. The market perceives that Thai software do not meet industrial standard.This make the local software miss the opportunity to work on any large projects. The policy to encourage demand for IT in government sector or to encourage the use of locally developed software so far has not had a positive impact on the local software businesses. The software businesses view that the impractical procurement process is the main barrier. The government agencies still have procurement rules and regulations that discourage small businesses and hinder them from taking on such projects. This results in small businesses being deprived of work opportunities and the chance to make their products known to the public. In addition, many government agencies lack confidence in Thai software developers while having strong faith in large businesses.

To stimulate the use of locally developed software, the businesses suggested that government agencies should act as a mediator between customers and developers, like what they did before in the ‘Thailand Software Fair’, held several years ago. Such events, they recommend, should be held annually.

3. Challenges in international markets: The software businesses claim that there is not sufficient information about international markets available for them.The government had not done enough in promotional activities and lacks a good PR for the industry. Some believes that there is no market for local developers. Thai software is unknown to foreign markets and still lacking certified standard to

guarantee quality. These factors altogether result in a lack of confidence in the software products delivered by Thai developers.

There was a recommendation from businesses that the government should play an important role in standard setting for locally made software so as to raise their standard and their recognition in international market. Developers should also be encouraged to join international competitions such as the Asia Pacific ICT Award (APICT) so that Thai software is more widely known in the international arena.

4. Source of Fund: As software is intangible, it is rather difficult to use them as collateral to secure loan from financial institutes. Moreover, the existing rules and regulations for loan are too strict and impractical for a small business like software. Besides, there is no established agency to evaluate the intellectual property which results in developers being unable to use their software assets to apply for assistance from financial institutes. The businesses believe that the government should help them to access funding sources, provide a loan scheme or allow them to use their software products to guarantee the loan.

5. Technological Challenges: The rapid technology advancement of the modern age makes it rather difficult to keep pace with developments. The government should therefore set up a training center and disseminate information about new technologies, by focusing on the technical know-how so as to facilitate the capacity building of industry. News and information for the latest technological trends from abroad should also be translated into Thai language and passed on to a wider public for in depth studies.

6. Copyright infringement: Local entrepreneurs agree that there are fewer cases of copyright infringement and that the private sector now favors licensed software. However copyright infringement remains a major problem among certain groups of users, namely household and small businesses. The BSA[14] estimated that

[14] Cited from the "2006 Global Software Piracy Study," Business Software Alliance, May 2007. http://w3.bsa.org/glocalstudy//upload/2007-Losses-Global.pdf

in 2006 copyright infringed assets amounted to USD 421 million. This rate is still higher than that in many other countries including Taiwan, the Philippines, Indonesia and Malaysia. For this reason, local developers believe the government should strengthen preventive and law enforcement measures on software copyright infringement.

Computer Services

In 2007, as shown in Table 9, the value of the computer services market amounted to USD 613 million (20,703 million baht), a 17% increase from the preceding year. Where classification by types of services, it was found that the System Integration service held the highest market share with 45.3%, worth USD 278 million (9,380 million baht)(Figure 13). The second highest was HW&SW Maintenance service, which accounted for a 15.1% share or USD 92 million (3,113 million baht), followed by the IT Outsourcing service with a 14.4% share or USD 88 million (2987 million baht).

Table 9: Computer Services by Categories in 2006 – 2008

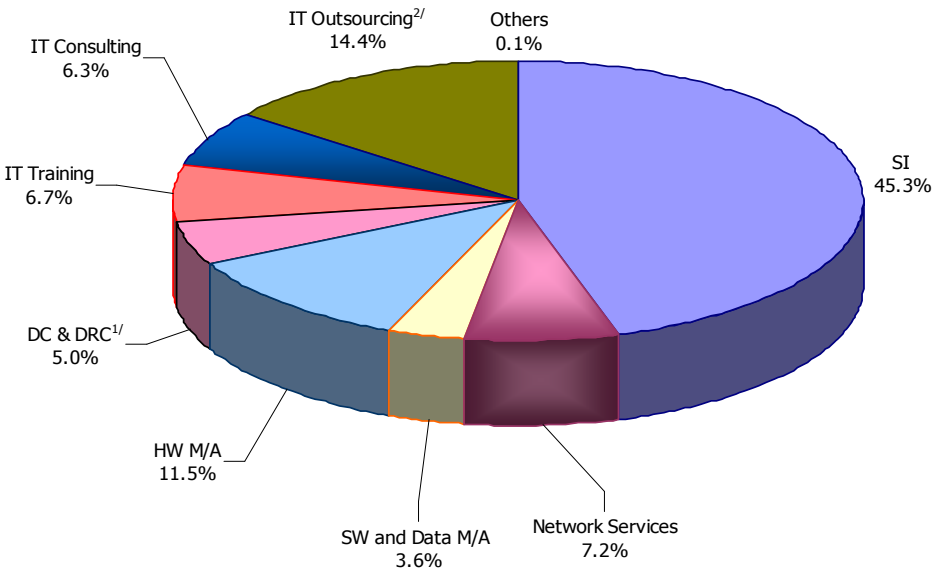
Categories	Market Value (Mil. USD)			Growth Rate (%)	
	2006	2007	2008	06/07	07/08
1. System Integration: SI	229	278	359	21.3	29.5
2. Network Services	41	44	55	7.1	25.2
3. Software and Data Maintenance Services	18	22	25	20.8	13.0
4. Hardware and Maintenance Services	66	70	74	6.3	5.7
5. Data Center and Disaster Recovery Center[1/]	26	31	40	19.0	30.5
6. IT related Training & Education	36	41	49	13.1	20.3
7. IT Consulting	34	38	50	11.9	30.7
8. IT Outsourcing[2/]	73	88	123	21.5	39.8
9. Others	0	1	1	N/A	N/A
Total Computer Services Market	**523**	**613**	**777**[3/]	**17.0**	**26.9**

Remarks: [1/] Data Center and Disaster Recovery Center include Web Hosting/Mail Hosting, Co-Location Service/ Dedicated Server Services, Disaster Recovery Services and Others (those located in the Data Center and outside the Data Center).

[2/] IT Outsourcing includes Enterprise-Wide, Network and Desktop Management, Application Management and Others.

[3/] The number is rounded up.

Figure 13: Proportion of Computer Services Market by Types of Services in 2007



Remarks: 1/ Data Center and Disaster Recovery Center include Web Hosting/Mail Hosting, Co-Location Service/ Dedicated Server Services, Disaster Recovery Services and Others (those located in the Data Center and outside the Data Center).
2/ IT Outsourcing includes Enterprise-Wide, Network and Desktop Management, Application Management and Others.

In terms of the value of spending in the computer services market, as displayed in Table 10, the enterprise sector held the highest spending record, amounting to 76.2% of the total spending in this market or USD 467 million (15,782 million baht). The second highest was the government sector and state enterprises with USD 124 million (4,185 million baht) in value or 20.2% share, while the household and SoHo spent the least with only USD 22 million (737 million baht) or 3.6%.

The government has not spent as much in this market due to the economic and political insecurity and instability. This has resulted in government agencies delaying their investment in many information technology projects during the first three-quarters of the year (2007). The household sector has also delayed spending on IT training with the same reason, the economic slowdown.

Table 10: Computer Services Spending by Economic Sectors in 2007

Sector	Value (Mil. USD)	Ratio (%)
Government	124	20.2
Enterprise/Corporate	467	76.2
Household/SoHo*	22	3.6
Total	**613**	**100.0**

Remarks: *Small office and Home office

Factors affecting the growth of the computer services market in 2007 are as follows.

- Rules and Regulations: The new Computer-Related Crime Act 2007[15], came into force in 2007, and the Risk Management System (Basel II) are among the factors that influenced market growth. Since the Computer-Related Crime Act was first in effect in mid 2007, both government agencies and private sector have become more alert and active in improving their IT related work systems within their organizations. They are particularly focused on the new security measures that were introduced in accordance with this Act. This has led to more investment in IT in order to support the measures. Banks and financial institutes have continuously invested in IT in order to adjust their work systems so that they meet the standard set by the new Risk Management Practices (Basel II) recently enforced by the Bank of Thailand.

- Globalization and free trade agreements such as WTO and FTA have also contributed to the market's expansion. More international companies have begun to invest in Thailand and open regional office here while following their parent organization's policies on such matters as data back-up and security systems, this business pattern will create a demand for IT and subsequently lead to the expansion

[15] It has been entered into force on 18th July 2007

of market for local computer services.

As for the trends in the computer service market in 2008, it is expected that the market will still grow from the preceding year, with a growth rate up to 26.9%, amounting to USD 777 million (26,264 million baht), as presented in Table 9. The market with the highest expected growth rate in 2008 is the IT Outsourcing, with a 39.8% increase from the preceding year to reach USD 123 million (4,174 million baht) in value. Since IT Outsourcing has become a new alternative for organizations seeking to achieve cost control, to save themselves from investment challenges, and to acquire effective IT management, such organizations are therefore focusing on their core business. Other non-core services such as the IT system are likely to be outsourced to other companies that specialized in that particular services. The service with the second highest expected growth rate is IT Consulting, with a 30.7% rise, amounting to USD 50 million (1,692 million baht), followed by the Data Center and the Disaster Recovery Center with expected growth rates of 30.5% or USD 40 million (1,352 million baht), respectively.

Key factors contributing to computer service market growth in 2008 are as follows:

- The democratic, elected government, which is likely to adopt the IT market promotion policy[16] which will have a positive effect on the IT market as a whole, including hardware, software and computer services.

- Rules and Regulations such as the Computer-Related Crime Act 2007: The security measures introduced by this Act will strictly be enforced in 2008[17]. This, inevitably, results in businesses and organisations paying attention to security issues. They are therefore obliged to invest as much as possible in amending and improving

[16] For example, the e-Ticket development project and the project of the Bangkok Mass Transit Authority's etc.

[17] The Computer-Related Crime Act was entered into force on 18th July 2007. On 21st August 2007, minister of Information and Communiction Technology signed the announcement the terms and conditions for service providers in keeping log files. This rules of conduct are published in the Thai Royal Gazette on 23rd August 2007.

their systems in order to meet the criteria required by law. These criteria include, for example, log files that must be maintained for a minimum of 90 days. This measure leads to an increasing need for highly secure and large storage space, resulting a higher growth in Data Center and Disaster Recovery Center markets. In addition, the increasing need for security systems may result in more in such specific fields as security and network services.

- The fast changing technology developments, especially in communication technologies (WiFi/WiMax and 3G) : This results in more investment in IT systems by all types of service providers in the telecommunications, banking and financial sectors in order to support and provide new services made available by these new technologies such as, emergency disaster warnings via SMS. This will have a huge impact on the IT Outsourcing businesses providing Help-desk services that offer a convenient and prompt response.In addition, the Service-Oriented Architecture and the RFID also have an impact on the market growth of computer services. This is because more businesses such as those in logistics, trade, banking and financial institutes have adopted the RFID technology, resulting in new services such as RFID card for cash. In order to adopt the RFID technology, businesses have to improve their organisation's internal systems and make them compatible with the RFID operation system, thereby contributing to computer service market first which also results in the growth of computer service market.

Communications

The communications market survey, as displayed in Table 11, revealed the market was value of USD 11,574.5 million (391,217.8 million baht). Of this, 60% came from communication services or USD 7,039.1 million (237,922.6 million baht).The remaining 40% was the communication equipment market, which accounted for USD 4,535.4 million (153,295.1 million baht). It is expected that the value for the overall communications market in 2008 will grow by 12.8%, and amount to USD 13,063.5 million (441,547.5 million baht). The results of the communications market survey can be summarized as follows:

Table 11: The Communications Market in 2006-2008

Categories			Product & Service	Value (Mil. USD)			YTY Growth (%)	
				2006	2007	2008	06/07	07/08
1	**Communication Equipments**			**4,400.2**	**4,535.4**	**5,029.5**	**3.0**	**10.8**
	1.1	*Voice Communication Equipments*		*2,561.7*	*2,821.3*	*3,042.5*	*10.1*	*7.8*
		1.1.1	Telephone Handset	57.9	62.6	65.9	8.0	5.3
			- Traditional Handset	44.3	43.2	45.4	-2.3	5.0
			- IP Phone	-	5.9	7.1	Na.	20.0
			- Fax	13.7	13.5	13.5	-1.5	0.0
		1.1.2	Mobile Handset	2,248.1	2,504.6	2,751.5	11.4	9.8
			- Traditional Handset	1,611.2	1,922.5	2,125.0	19.3	10.5
			- Smart Phone	537.1	511.0	551.9	-4.8	8.0
			- PDA Phone	99.9	71.0	74.6	-28.9	5.0
		1.1.3	PBX/PABX	255.6	254.1	225.1	-0.5	-11.4
			- Traditional PBX	236.7	231.8	197.0	-2.0	-15.0
			- IP PBX	18.9	22.4	28.0	18.1	25.4
	1.2	*Data Communication Equipments*		*1,838.5*	*1,714.1*	*1,987.0*	*-6.7*	*15.9*
		1.2.1	Wired Line	1,285.7	1,136.7	1,250.9	-11.5	10.0
		1.2.2	Wireless	552.8	577.3	736.1	4.4	27.5

Categories			Product & Service	Value (Mil. USD)			YTY Growth (%)	
				2006	2007	2008	06/07	07/08
2	**Communication Services**			**6,348.2**	**7,039.1**	**8,034.1**	**10.8**	**14.1**
	2.1	*Voice Communication Services*		*5,127.6*	*5,612.8*	*6,308.7*	*9.4*	*12.4*
		2.1.1	Fixed Line Voice	900.2	817.7	794.3	-9.1	-2.8
		2.1.2	Mobile Voice	4,227.4	4,795.1	5,514.4	13.4	15.0
	2.2	*Data Communication Services*		*1,220.6*	*1,426.3*	*1,725.4*	*16.8*	*20.9*
		2.2.1	Traditional Data	237.2	249.7	274.6	5.2	10.0
		2.2.2	IP Service	211.0	239.8	287.8	13.6	20.0
		2.2.3	Internet Access	376.5	458.5	573.6	21.7	25.1
		2.2.4	Mobile Non voice	395.9	478.3	589.4	20.8	23.2
Total Communication Market				**10,748.4**	**11,574.5**	**13,063.5**	**7.6**	**12.8**

1. Communication Equipments: The market is classified into two categories which are voice communication equipments and data communication equipments.

1.1 Voice Communication Equipments: This category covers telephone handsets, which includes traditional telephone handsets, fax machines and IP phones; the mobile handsets, comprising traditional mobile handsets, Smart Phones and PDA Phones; and the Private Branch Exchanges, which includes both the Traditional PBX and the IP PBX. According to the survey, the total value for the communication equipment market was USD 2,821.3 million (95,359.7 million baht). The market is expected to grow by 7.8% in 2008, amounting to USD 3,042.5 million (102,835.1 million baht).

According to Table 11, in terms of its sub-markets, the traditional telephone handset market was worth USD 43.2 million (1,461 million baht) in 2007, having dropped by 2.3% from 2006 while the fax machines worth USD 13.5 million (455.0 million baht) representing 1.5% decrease from the preceding year. The growth rate in 2008 of the traditional fax machine is expected to remain the same as that of 2007 which results from the growth of All-in-One Printer market. However the fax machine

market is not likely to shrink any further from the preceding year due to the emerging of cordless fax technology that comes with bigger and color LCD monitors.

The telephone handset has also gained more attention this year compared to the previous year due to the emergence of telephone handsets that support IP Phones. In 2007 the IP Phone market was worth USD 5.9 million (199.3 million baht) which is considered a positive factor affecting the telephone handset market and is expected to have good prospects in the next two years (2008 - 2009).

The mobile handset market still continues to grow steadily. In 2007 it was worth USD 2,504.6 million (84,653.9 million baht). Although its total sale has increased from the preceding year, but the over all market does not seem to expand that much due to the decrease in the mobile phone's price. In addition, the economic slowdown in 2007 has affected consumers' concern for their spending, resulting in a 4.8% and 28.9% fall in the Smart Phone and PDA Phone markets, leaving the two markets valued in 2007 at USD 511 million (17,273 million baht) and USD 71.0 million (2,400 million baht) respectively.

However, in 2008, the Smart Phone and PDA Phone are likely to grow by approximately 8% and 5% respectively. This results from increasing demands for the mobile non noice service and the increasing demands for high-speed wireless internet in the future.

As for trends in 2008, the overall mobile handset market is expected to grow by 9.8% or amounts to USD 2,751.5 million (92,999 million baht). This is a result of the positive impact from the development of mobile phones' functions and handsets' designs that are better and effectively support complete entertainment features, especially those with digital cameras and an MP3 player installed in handsets. Apparently, handsets with these technologies have gained in popularity among users.

In addition, local brand mobile handsets have become increasingly popular because of a relatively low price in comparison to international brand handsets. It is

expected that the market share of mass produced mobile handsets will increase dramatically in 2008.

Moreover, the high resolution of built-in digital cameras in mobile handsets which now have been upgraded to up to 5 mega pixel does create some demand in this market. Likewise, additional functions in cameras in the handset have nearly the same level of performance as that of the digital cameras. The capacity of the handsets' memory has also been upgraded to store more audio files and equipped with easy audio control function.

The multimedia mobile handsets that support the 3G system are expected to receive increased attention in 2008. The Touch-Screen handsets that support dual standby and can host two SIM cards in one unit, support mobile TV and allow users to download video clips are also expected to gain in popularity.

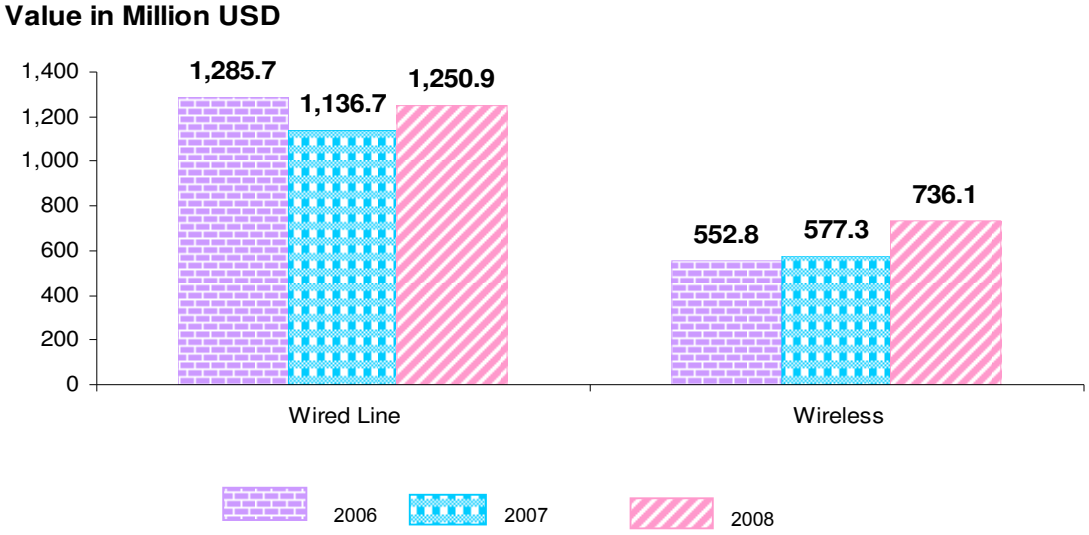
Mobile handset developers have also added new technologies to the existing functions on their phones. These technologies include, for example, a motion sensor which allows users to switch to a different menu function by simply shaking the device, and Green production technology, which employs materials and production processes that are environmental friendly. This type of mobile handset is also likely to receive greater popularity in the near future.

As for the Private Branch Exchanges (PBX), the market value of this product was USD 254.1 million (8,589.9 million baht). The traditional PBX's growth rate was estimated to drop by 2% in 2007 and would continue to fall further by 15% in 2008 due to reductions in mobile service charges and an increase in the use of Voice over IP. This has resulted in a decrease in the use of telephone handsets which subsequently affects the PABX market. However the IP PBX, which can communicate on both voice and data, was valued at USD 22.4 million (756 million baht) in 2007 and is expected to grow by 25.4% in 2008, amounting to USD 28 million (948 million baht), due to a steady increase in demand for Voice over Internet Protocol (VoIP).

In conclusion, the voice communication equipments market will continue to grow because of the increasing demand for the VoIP which leads to rising demand for IP Phones and the IP-PBX. Besides, the mobile handsets that support 3G and the dual standby system as well as the ones containing new production technologies are likely to serve as positive factors that drive the voice communication equipment market growth in 2008.

1.2 Data Communication Equipments: This category contains wired line and wireless equipments, which also includes the network carrier used in both wired and wireless networks such as TDM Switching, IP core networks, LAN, cable and fiber optic. The 2007 survey found that the data communication equipment market was valued at USD 1,714.1 million (57,935.4 million baht). The negative influenced from political instability and the uncertainty regarding government policy resulted in delays in investment in several projects, especially in the 3G network. The data communication equipment's growth rate has therefore fallen from the preceding year by 6.8%. However, it is expected that the market will recover and grow by 15.9% in 2008, USD 1,987 million (67,160.7 million baht).

Figure 14: Data Communication Equipment Market in 2006 - 2008



Considering the sub-categories under the data communication equipment market, the wired line market accounts for USD 1,136.7 million (38,421 million baht) representing a 11.5% fall from the preceding year (Table 11). This was due to

delays in the government projects by major telecommunication service providers. However it is expected that the investment situation will improve in 2008, resulting in approximately 10% growth in the wired line equipment market, estimated at USD 1250.9 million (42,280.3 million baht) (Figure 14).

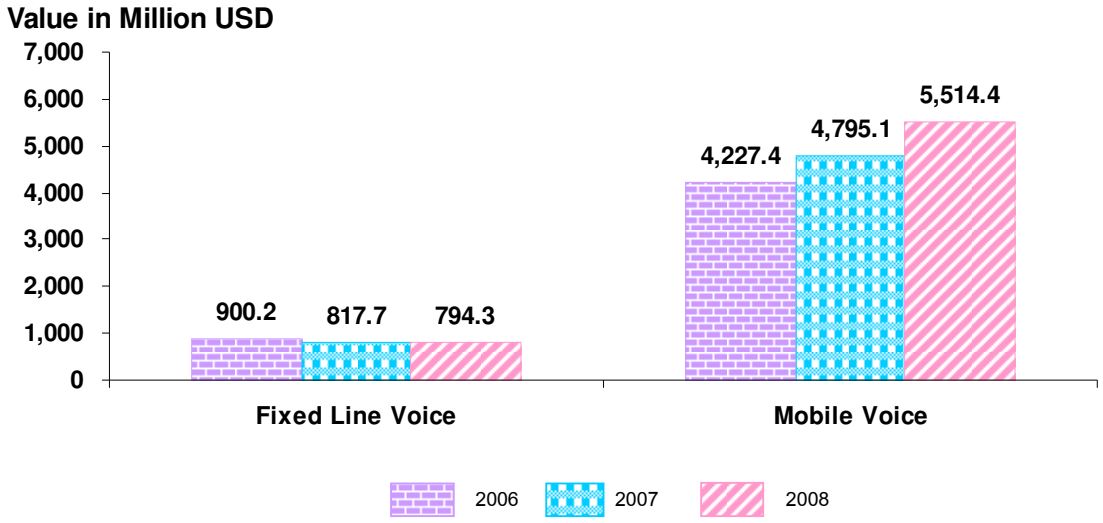
The wireless equipment market, on the other hand, has grown by 4.4% in 2007 as compared to 2006 and is expected to expand considerably in 2008 with 27.5 % growth rate, amounting to USD 736.1 million (24,880.3 million baht). Such rapid growth results from investment in network expansion and government spending in mega projects, and several other projects, such as 3G and Wi-Max projects, which had been postponed from 2007. These are the powerful driving forces that attract more investment in ICT network infrastructures in this country and the very important factors that will generate more demand for network use in the future. In any case, competition in the data communication equipment market, especially in the wireless equipment, is expected to be more intense than in the preceding year.

2. **Communication Services:** This market is divided into two sub-categories, namely voice communication services and the data communication services. The overall communication service market was worth USD 7,039.1 million (237,922.6 million baht) in 2007, a 10.8% rise from the preceding year. It is expected that in 2008, the market will grow by 14.1%, amounting to USD 8,034.1 milion (271,551.7 million baht).

2.1 Voice Communication Services: This market was worth USD 5,612.8 million (189,713.3 million baht), including both fixed line voice service and mobile service. The survey found that in 2007 the value of fixed line voice service market has decreased from the preceding year by 9.1%, amounted to only USD 817.7 million (27,638.9 million baht) (Figure 15). It is expected that this market will continue to fall by 2.8% in 2008 to be valued at only USD 794.3 million (26,848.2 million baht). This results mainly from the rising number of mobile service users, following fierce price competition among the service providers. This leads to mobile service charges being as low as or even lower than those of fixed line. Besides, the

network coverage of the fixed line voice services network is mainly concentrated in cities. This results in users turning to the mobile voice services which are convenient to subscribers have good network coverage and are of similar usage charge. In addition, the demand for fixed line voice services has shifted mainly to long-distance telecommunication services, both domestic and international. Although the charges for fixed line voice services have been reduced.They still cannot stimulate much market growth, because the emerging VoIP technology with a lower price has started to gain more popularity among users.

Figure 15: Voice Communication Service Market in 2006 - 2008



In 2007 the mobile voice service market was worth USD 4,795.1 million (162,074.4 million baht), accounting for 85.4% share of the voice communications market (Figure 15). It is expected to grow by 15% in 2008. The market can still continue to grow despite the fact that the number of mobile service users has almost reached its maximum capacity. The key factor that has driven market growth is an increase in number of pre-paid service users. A new customer base from provincial areas and customers with more than one number has increased steadily. As a result, it is estimated that in 2008 the number of users will rise approximately by 8-9 millions.A price war is expected to slow down. However, mobile network service

providers are likely to compete against one another more in terms of network coverage and quality as well as the provision of value-added services.

The 2008 business model adopted by service providers is likely to focus more on partnership building between the mobile service providers and fixed line voice service providers. The objective will be to improve on network quality by introducing new features and technologies and to increase the capacity of mobile services, such as green or energy savings network, incorporating a variety of energy saving technologies within the network systems. In addition, the development of the High-Speed Downlink Packet Access (HSDPA) for supporting Mobile Internet Broadband on 850MHz frequency will enhance the quality of direct motion pictures and voice broadcasting to mobile phones. The HSPDA technology will serve as a positive factor for the mobile voice services market in 2008, allowing mobile handsets to effectively support multimedia services such as live VDO and audio streaming, as well as better facilitating information sharing between users in remote areas.

2.2 Data Communication Services : According to Figure 16, the services that held the highest share in the data communication services market are the mobile non voice and the internet access services with 33 % and 32% share respectively. The overall market value of data communication services was USD 1,426.3 million (48,208.2 million baht) in 2007 and this is expected to grow by 20.9% in 2008, amounting to USD 1,725.4 million (58,317.8 million baht). This results from an increase in the number of internet users, especially those using ADSL, Leased Line and WiFi high speed Internet. Due to the still rather small customer base for this type of service and the price competition, Internet service charges have been driven down in order to allow each service provider to expand their customer base. In addition, an increasing number of international internet gateway service providers will ease out heavy traffic in the network, enhancing the speed of international connectivity and making such connections cheaper. This is also likely to affect the growth rate of the traditional data and IP service markets in 2008, which are expected to rise by 10% and 20% respectively.

Figure 16: Proportion of Data Communication Services by Category in 2007

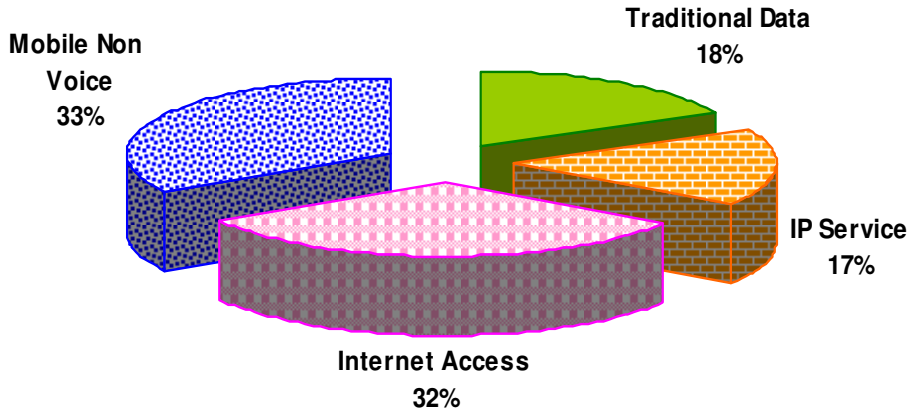
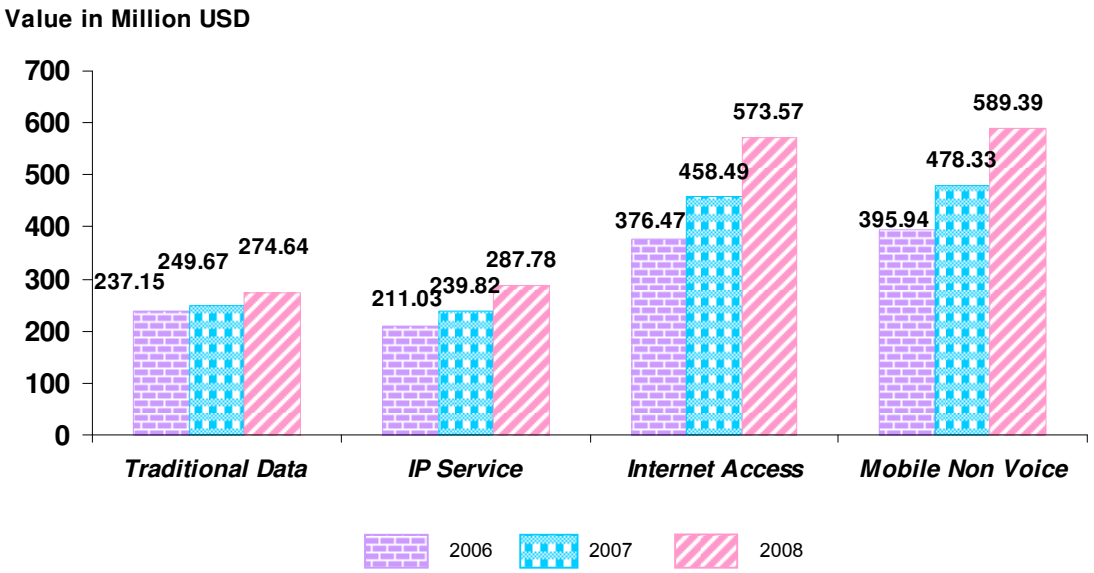


Figure 17: Value of Data Communication Services Market in 2007



According to Figure 17 which shown data communication services, the internet access services market was valued at 458.5 million USD (15,496.8 million baht) in 2007 and is expected to rise by 25.1% in 2008, amounting to 573.6 million USD (19,386 million baht). The broadband market is likely to hold the highest record in sales, as a result of the boost to network technologies such as 3G, Wi-Max, Power Line Communication and Fiber to the Home (FTTH) that are already being developed by service providers. There is also a tendency that the number of Broadband over Power Line (BPL) users will increase in the future. Its thorough

outreach, which is greater than other types of network, means that its network coverage is greater than others. A wide range of network development projects have consequently paved the way for Internet Access Services, as well as other data communication services to grow. However, in 2008, Internet access service providers still have to contend with fierce competition both in terms of price and quality of internet access links. Those without their own network or a Class 3 License are at a disadvantage, compared to those who are ready to expand and develop their own network to support the changing technologies.

The mobile non voice service accounted for 33% of the total market value of all communication data services, or USD 478.3 million (16,167.6 million baht). It is expected to grow further in 2008 by 23.2%, amounting to USD 489.4 million (19,921.5 million baht). According to the market trends, digital music, VDO clips and games are believed to be the driving force that will encourage higher Internet access via GPRS in 2008.

The study has divided communication equipment users according to types and usage into three categories: 1) Operator; 2) Corporate[18], which includes both the large scale enterprise and SMEs; 3) Household, Small Office and Home Office (SoHo).

Table 12: Communication Equipment Spending by Economic Sectors 2007

Categories		Total		Operator		Corporate		Household/SOHO	
		Value (Mil.USD)	Ratio (%)	Value (Mil.USD)	Ratio (%)	Value (Mil.USD)	Ratio (%)	Value (Mil.USD)	Ratio (%)
Voice Equip.	Telephone Handset	62.6	100	25.5	40.7	34.4	55.0	2.7	4.3
	Mobile Handset	2,504.6	100	52.1	2.1	417.5	16.7	2,034.9	81.2
	PBX/IP-PBX	254.1	100	177.9	70.0	73.7	29.0	2.5	1.0
Total Voice Equipment		***2,821.3***	***100***	***255.5***	***9.3***	***525.6***	***18.6***	***2,040.2***	***72.1***

[18] Spending sector in communication market is classified slightly different from what done in other ICT market, but it is comparable. The corporate sector is equivalent to enterprise sector in other ICT market.

Categories		Total		Operator		Corporate		Household/SOHO	
		Value (Mil.USD)	Ratio (%)	Value (Mil.USD)	Ratio (%)	Value (Mil.USD)	Ratio (%)	Value (Mil.USD)	Ratio (%)
Data Comm. Equip.	Wired Line	1,136.7	100	800.4	70.4	316.3	27.8	20.1	1.8
	Wireless	577.3	100	364.1	63.1	199.7	34.5	13.6	2.4
Total Data Comm. Equipment		***1,714.1***	***100***	***1,164.4***	***67.9***	***516.0***	***30.1***	***33.6***	***2.0***
Grand Total		**4,535.4**	**100**	**1,419.9**	**31.3**	**1,041.6**	**23.0**	**2,073.8**	**45.7**

According table 12, the household/SoHo was the largest spenders in the overall communication equipment market, taking up 45.7% share or USD 2,073.8 million (70,095.1 million baht). The second rank spender was the operators with a 31.3% share or worth USD 1,419.9 million (47,993.6 million baht), followed by the spending of corporate, with a 23% share, worth USD 1,041.6 million (35,206 million baht).

Upon analyzing the market in more detail (Table 12), the largest spenders in the voice communication equipment market was in household/SoHo sector, accounting for USD 2,040.2 million (68,957 million baht) or a 72.1% share. The majority of spending went to mobile handsets. The second largest spender was the corporate group, with an 18.6% share, worth USD 525.6 million (17,766.6 million baht).

In the data communication equipment market (Table 12), the operator group was the largest spender, accounting for 67.9% of the market share, worth USD 1,164.4 million (39,358.4 million baht). The corporate group ranked second in this area, with a 30.1% share, worth USD 516 million (17,439.7 million baht). Wired Line was the equipment holding the highest purchase record in every category.

For the communication services (Table 13), from the demand side, the spending sector has been categorized into three categories: 1) Government (such as education institutes, ministries and departments, etc) 2) Corporate, which includes the large scale enterprise and SMEs and 3) Household, Small Office and Home Office (SoHo).

Table 13: Communication Services Spending by Economic Sectors 2007

Categories		Total		Government		Corporate		Household/SoHo	
		Value (Mil.USD)	Ratio (%)	Value (Mil.USD)	Ratio (%)	Value (Mil.USD)	Ratio (%)	Value (Mil.USD)	Ratio (%)
Voice Service	Fixed Line Voice	817.7	100	65.4	8.0	237.1	29.0	515.2	63.0
	Mobile Voice	4,795.1	100	95.9	2.0	863.1	18.0	3,836.1	80.0
Total Voice Service		***5,612.8***	***100***	***161.3***	***2.9***	***1,100.3***	***19.6***	***4,351.2***	***77.5***
Data Comm. Service	Traditional Data	249.7	100	74.9	30.0	144.8	58.0	30.0	12.0
	IP Service	239.8	100	40.8	17.0	163.1	68.0	36.0	15.0
	Internet Access	458.5	100	22.9	5.0	160.5	35.0	275.1	60.0
	Mobile Non Voice	478.3	100	4.8	1.0	88.5	18.5	385.1	80.5
Total Data Comm. Service		***1,426.3***	***100***	***143.4***	***10.1***	***556.8***	***39.0***	***726.1***	***50.9***
Grand Total		**7,039.1**	**100**	**304.7**	**4.3**	**1,657.1**	**23.5**	**5,077.3**	**72.1**

Table 13 shows that the communication service market in general was largely driven by the household (SoHo), holding 72.1% of the market and worth USD 5,077.3 million ((171,613.7 million baht). The second most important spender was the corporate group which accounts for a 23.5% share or USD 1,657.1 million (56,010.1 million baht).

For the market of voice communication, household and SoHo was the largest spender. The spending in this sector was worth USD 4,351.2 million (147,072 million baht) or a 77.5%. The second in rank was the corporate with spending accounted for 19.6%,or worth USD 1,100 million (37,188.6 million baht). The service most often used is the mobile voice service.

In the data communication service market, the highest spender was the household/SoHo, with 50.9% share of the market, worth USD 726.1 million (24,541.6

million baht). The second largest spender was the corporate group, with a 39% share, worth USD 556.8 (18,821.4 million baht). Mobile non voice and internet access are the services used most in this market (Table 13).

In conclusion,it is expected that the most significant driving force for the communications market in 2008 would be an increase in usage of broadband internet services, especially wireless high speed internet, which is likely to affect businesses in both the communication equipment and the communication service markets. With respect to the communication equipment market, the increasing demand for high speed internet access will have a strong impact on the sales and growth of mobile handsets that support 3G and Wi-Max technologies. All smart phones, PDA phones, IP Phones, as well as other network equipments that support internet protocol network will play a more important role in the market in 2008. Additionally, the National Telecommunications Commission (NTC's) approval of the use of communication equipment that is compatible with Wireless 11a[19] will stimulate the sales of communication equipment that supports such a system even further.

The communication service markets that have enjoyed a positive contribution from the demand for high speed Internet access are the Mobile Non-Voice, the Internet access, and the Virtual Private Network (VPN) services. The most significant drivers are from the expansion and development of network technologies such as 3G, Wi-Max, Wi-Fi, Power Line Communication and the Fiber to the Home (FTTH). These also include technologies that enhance the efficiency of the network such as the IP Multimedia System (IMS), the 802.11n or the Wireless N technologies, which will result in a rising demand for multimedia services on mobile handsets, and subsequently WLAN services at corporate level. These technologies can enhance the efficiency of the existing wireless network, allowing greater service coverage and bandwidth. This will better facilitate a wide variety of applications via the corporate wireless network and consequently stimulate the use of multimedia services within the organization.

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[19] To be entered to enforce on the 31 th of January 2007

Among the trends in 2008, we will see further adaptations of production technologies that are environmentally friendly. These have been applied to the production of telecommunications and network equipment. In any case, the development of the local communications market still depends, to a large extent, on government policy and its necessary regulations which need to be precise and promptly implemented in order to keep pace with fast changing technological trends.

Definition and Methodology

Definition

Computer Hardware Market:

In the 2007 survey, to keep pace with changing technologies as well as to reflect the Thai market, the definition of the computer hardware was slightly changed. The PC Server has been moved into the market of the Small Scale Systems. The Special Purpose Equipment has been expanded to cover the Point of Sale System (POS) Mini Notebooks is a new product in notebook market that was introduced in this survey. The PDA phones have been moved to communication equipment market due to the enhancement in capability of the smart PDA.

In 2007, the computer hardware market is divided into two main categories which are Systems and PC & Peripheral

1. Systems comprise of

    1.1 Large Scale Systems: This means large computer machines and high-speed scientific computers which can handle heavy workload and massive, complicated calculations. These machines can run around the clock and handle tasks that require a highly reliable system. Businesses that require such computers are banking and finance. Examples of such computers are the Mainframe, Tandem, IBM Z series, IBM P595, IBM I595, HP Integrity Superdome, SUN SPARC Enterprise M8000, SUN SPARC Enterprise M9000, SUN FIRE E20K, SUN FIRE E25K and Fujitsu Primepower.

    1.2 Medium Scale Systems: This refers to such computers as super mini class and mid-range computers, which support a slightly smaller workload than a large scale system machine. Businesses that rely on these types of these systems are the Automotive and Oil & Gas industries. Examples of these machines are IBM P570, IBM P560, IBM I570, HP 76XX, HP Proliant 300 Series, HP Proliant 500 Series, HP Proliant BL400 Series Blade, HP Proliant BL 600 Series Blade, SUN SPARC Enterprise M4000,

SUN SPARC Enterprise M5000, SUN FIRE V490, SUN FIRE V890, SUN FIRE E2900, SUN FIRE E4900, SUN FIRE E6900 and Fujitsu Primergy.

1.3 Small Scale Systems: This includes small computers, control and communication servers, computer peripheral, database and network equipment, as well as computers with high efficiency graphic related programmes. These machines are for businesses, whose workload is smaller than those demanding equipment from Medium or Large Scale Systems. Examples of such machines are IBM X series, IBM P550, IBM P520, IBM P510, IBM I515, IBM I520, IBM I525, IBM I550, HP Integrity 26XX, HP Integrity 36XX, HP Integrity 66XX, HP Proliant 100 Series, SUN SPARC Enterprise T5XXX, SUN SPARC Enterprise T1000, SUN SPARC Enterprise T2000, SUN FIRE 1000, SUN FIRE 2000, SUN FIRE X4XXX, SUN FIRE X2XXX, SUN FIRE V125, SUN FIRE V215, SUN FIRE V245, SUN FIRE V445 and Fujitsu Primergy.

1.4 Special Purpose: This refers to computers specially designed to handle specific tasks and cannot be used for other purposes. Examples of these are used in the Banking System and POS System.

2. PC & Peripherals category are divided into five different sub-categories, namely the Total PC, Monitor, Printer, External Data Storage and other Peripherals. Details of each category are as follows:

2.1 Total PC

2.1.1 Desktop PC

2.1.2 Notebook

2.2 Monitor (excluding monitor bundling with PC)

2.2.1 CRT

2.2.2 LCD

2.3 Printer

2.3.1 Dot Matrix

2.3.2 Inkjet Printer,divided into Single Inkjet and All In One Inkjet

2.3.3 Laser Printer,divided into Single Laser and All In One Laser

2.4 External Data Storage

2.4.1 External Hard disk

2.4.2 External Enterprise Storage

2.4.2.1 Entry Level: Storage for Small Scale Systems

2.4.2.2 Hi-End Level: Storage for Medium to Large Scale Systems

2.5 Other Peripherals

2.5.1 Scanner

2.5.2 Digital Camera

2.5.3 PDA

Computer Software Market

Software refers to a set of codes or programmes used for operating computers and related devices. In this study, the software has been classified into three categories.

1. By Delivery Methods: This category comprises of Packaged Software and Outsourced Software
   - Packaged Software refers to software for sale, leasing or servicing by transaction or licenses base;
   - Outsourced Software refers to software designed and developed for specific uses. Software under this category does not include internal software development or improvement within the organisation.
2. By Users: This category includes the government, enterprise and household, including the SoHo, sectors.
3. By Type of Software: There are three groups under this category.
   - Enterprise Software: This type of software is meant to assist with general management or solution finding, human resource and specific corporate management. This type of software comes in both forms, the Packaged Software and Outsourced Software formats.

- Mobile Application: This type of software is for portable equipment such as PDA Phones. The mobile application software is categorized into two different groups based on the applications: (1) Enterprise Software (2) Entertainment related software
- Embedded Software: This is software embedded in electronics devices to make the device perform a specific function. This survey does not include software installed in small portable communication devices such as mobile handsets because such software has already been recognised under the Mobile Application category.
- Others: This refers to other software that has not been grouped in any grouped mentioned above such as games (excluding online games), and CAD/CAM and e-learning software etc.

Computer Service Market

The Computer Services market in this study is classified into nine categories which are

1. System Integration (SI): This is a service that offers a complete system design, including services which are part of the networking system such as planning, design, implementation and maintenance but excludes outsourcing.
2. Network Service: This includes network designing, planning and construction for both LAN and Wireless connection, which covers both interior and exterior network building.
3. Software and Data Maintenance Service: This service is a data service, which includes data entry and services relating to database system maintenance, but excludes the Computer-Aided Design or CAD, the Geographic Information System (GIS), the Electronic Data Interchange system (EDI), the e-Commerce system, online advertisements, the computing system for the ATM machines and the services offered by GPS service providers.
4. Hardware and Maintenance Service: This service includes Preventive and Proactive Maintenance services for hardware equipment, excluding computer

leasing and the cost of computers for leasing, the interest and cost born by the financial institutes offering related financial transaction services.

5. Data Center and Disaster Recovery Center: This category covers the businesses offer the facility and infrastructure services. The data centre and Disaster Recovery Centre offers the following services:
    - Web Hosting/Mail Hosting: This service provides web and mail hosting services, both in the location and off the location of the center.
    - Data Warehouse Hosting: For example:
        - Co-Location Services: These are services that offer a rented space for housing a server and other ICT equipment storage;
        - Dedicated Server Service: This service provides servers with an exact specification as requested by clients.

    Services under Data Center and Disaster Recovery Center do not include web design & programming, games and internet cafes.
6. IT Related Training & Education: This includes corporate training which continuously offers courses, but does not include training in educational institutes such as university, vocational institutes and schools or individual training programmes.
7. IT Consulting: This service offers consultancy and advice on IT related subjects, including IT strategies.
8. IT Outsourcing: This service involves the transfer of the management and/or day-to-day execution of an entire business function to an external service provider. The client organization and the supplier enter into a contractual agreement that defines the transferred services. For example
    - Enterprise-Wide Outsourcing: This type of agreement can only come from a well established enterprise. It pools a variety of outsourced services in the IT department together so that it can be managed systematically. This means IT service providers or outsourcers will take

over the whole of the IT department in the company. An example : Kasikorn Bank outsoured the IT section to the IBM.

- Network and Desktop Management Service: This service offers network and computer management within the organisation in order to ensure an effective, smooth and problem-free operation. This may include the monitoring of the existing resources and laying out future plans as well as listing additional items required to enhance efficiency. Services under this category include computer leasing.
- Application Management Service: This service offers application management under SLA control.

9. Others: This refers to other services do not fitted in to any category mentioned above. For example, multimedia and calling solution services, etc.

Communications Market

In the 2007 Communications survey, the market has been divided into two sub-categories, namely equipment and services.

1. Communication Equipments Market: This market covers both wired and wireless communication equipment. This market can be divided further into two groups:

   1.1 Voice Communication Equipment: This includes the following:

   1.1.1 Telephone Handset: which includes the traditional handsets, IP Phones and Fax[20];

   1.1.2 Mobile Handset: This includes traditional mobile handsets, Smart Phones and PDA Phones.

   1.1.3 Private Branch Exchanges (PBX/PABX): This includes traditional PBX/PABX and IP-PBX such as DVC and Digital Subscriber Line Access Multiplexer (DSLAM).

[20] Excluding integrated fax machines integrated in the All in One Printer which already counted in the computer hardware market.

1.1.4 Data Communication Equipment[21]: This market includes the following products:

1.1.5 Wired Line: Related equipment under this category includes switch, router, hub, NIC, modem, fibre optic, telephone cable, Wired LAN and Coaxial.

1.1.6 Wireless LAN: The main equipment under this category includes access card, access point, and wireless router, IP Core Networks, TDM Switching (Time Division Multiplexer Switching), SDH Equipment (Synchronous Digital Hierarchy Equipment), MPLS (Multi-protocol Label Switching), DWDM (Dense Wavelength Division Multiplexing), BTS (Base Station Transceiver), MSC (Mobile Switching Centre) and GGSN (Gateway GPRS Support Node).

2. Communication Services Market: This includes both the wired line and wireless communication service providers. The market has been divided into two sub-categories, namely voice communications and data communications. The details of each market are as follows:

2.1 Voice Communication Services: These include:

2.1.1 Fixed Line Voice Service, covering local and long-distance telephone services to domestics and international destinations (via satellite link or cables) as well as public payphone services.

2.1.2 Mobile Voice Service, covering both pre-paid and post-paid mobile voice services, excluding the Mobile Non Voice service.

2.2 Data Communication Services: These include:

2.2.1 Traditional Data, which includes leased circuit, ATM (Asynchronous Transfer Mode), SDH (Synchronous Digital Hierarchy), International Internet Gateway (IIG) and DARK Fibre;

2.2.2 IP Service, which includes IP-VPN (Internet Protocol-Virtual Private Networks) and VoIP (Voice over Internet Protocol);

[21] In the 2007 communication equipment market survey, the value of network carriers has been included in Wired Line and Wireless equipment.

2.2.3 Internet Access, which includes xDSL, Cable Modem, FWA (Fixed Wireless Access) and Metro Ethernet and Wireless LAN;

2.2.4 Mobile Non Voice, which includes GPRS, SMS/MMS/EMS, IVR and other Data Transmissions such as logos, ring-tone, ring-back-tone, wallpaper and games on mobiles.

Methodology

This market survey was conducted between November 2007 and January 2008. Data are collected mainly from key industry players, ICT enterpreneurs as well as retailers to reflect ICT spending. The data collections used were tele-surveys, in-depth interviews as well as gathering data from various secondary sources. The detial of methodology used in each market were:

1. Computer Hardware Market:

    - Data Collectining Method:

        - In-depth interviews with 34 key industry players (out of 43 targeted);
        - Information gathered from various sources such as newspapers, magazines and annual reports.

    - Data Analysis and Estimation: Based on information gathering from indepth interviews, secondary data and expert opinion/input. Statistical method as well as focus group meeting with key industry players was used.

2. Computer Software Market:

    - Data Collectining Method: In-depth interviews with 18 key players in software industry altogther with a tele-survey with 1,300 enterpreneurs. The governement record from the Department of Business Development together with company annual reports and news items were taken into account;
    - Data Analysis and Estimation: using statistical method and consultation with experts.

3. Computer Services Market:

    - Data Collectining Method: In-depth interviews with 29 key industry players in computer services, as well as tele-survey with 315

enterpreneurs, information from government record such as capital registration from the Department of Business Development and annual reports from the Stock Exchange of Thailand have been used;

- Data Analysis and Esitmation: using statistical method and consultation with experts.

4. Communications Market:

    - Data Collectining Method: In-depth interviews as well as questionnaire surveying have been employed with 100 business units with the majority were the key players[22] in each product/services. The second data from annual reports and news items were taken into account.
    - Data Analysis and Esitmation: based on caculation of the overall income in each group and using statistical method to average a value together with comments from expert.

[22] Key player means entrepreneurs that make a significant contribution to each product and service group, both in terms of market share and income. All the movements of these groups will have a strong impact on the communications market.