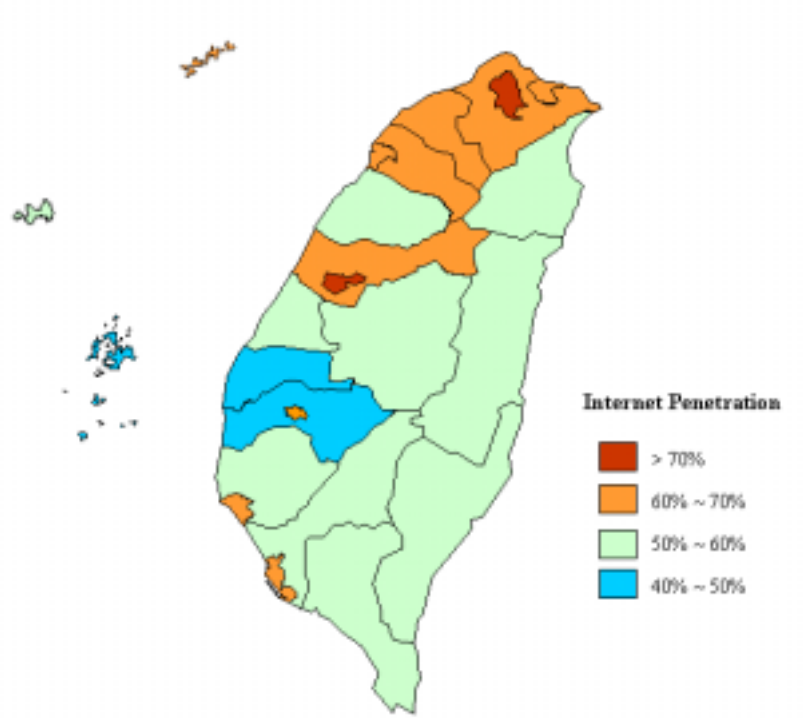
Digital Divide Report
2005



Research, Development and Evaluation Commission

Executive Yuan , Taiwan

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Part I The Digital Divide of Individual and Households

I. Introduction

According to “The Global Information Technology Report 2004-2005” published in March 2005 by the World Economic Forum, Taiwan was ranked 15th in the world and 4th in Asia regarding Internet availability. Thanks to its impressive achievements in ICT performance, Taiwan was chosen to be the case study in the report of this year.

However, despite its outstanding performance in the IT industry, Taiwan had encountered a similar problem, the digital divide, as other leading countries in the widespread process of the internet technology, which is inevitably resulted from different community groups having inconsistent accessibility to computers, during their use of the Internet at different periods of time.

Since 2004, to bridge the domestic digital divide and to realize the dream of equal e-opportunities, the government has incorporated the “The Program for Bridging the Digital Divide” into the “e-Taiwan Project” and listed it as a focal point for executive implementation. Each year the Research, Development, and Evaluation Commission (RDEC) conducts a digital divide survey, to evaluate the status of information infrastructure implementation and the result of digital divide reduction, hoping to understand the current situation of Taiwan’s digital divide through survey and research methodology consistent with modern social science standards. The results can be adopted not only as references for the government but also help to codify the digital divide policy accordingly, as well as evaluating the progress and benefits of the implementation of the digital divide policy. At the same time, it also helps to continuously make progress in the achievements through the digital divide research to further understand the domestic digital divide trend and integration, as well as interacting with the international study.

II. Study Methodology

In line with the purpose and spirit of its past studies, the 2005 digital divide survey was contracted to the Survey Research Center of UDN Group to conduct computer assisted telephone interviews (CATI) in the months of March and April, 2005. The population group with population at or above the age of 12 in Taipei City, Kaohsiung City, Kinmen County and Lienjiang County were chosen for this random sampling interview.

To constitute a reasonable sampling model, the survey was conducted after 6 p.m. on weekdays as well as in the late afternoon and evening on weekends. The survey resulted in 26,622 effective random sampling copies, and 981 copies of inflated samples in agriculture, forest, fishing and farming industries. The estimated and actual distribution of random sampling that was done in the counties and cities was shown in Table 1.

Table 1　Distribution of Samples by County and City

County/City	Numbers of residents aged 12 and above	Sampling Error	Sample Size	Valid Sample
Total	**19,204,153**	**±0.60%**	**26,470**	**26,622**
Taipei City	2,258,769	±3%	1,067	1,067
Kaohsiung City	1,294,665	±3%	1,066	1,066
Taipei County	3,148,594	±3%	1,067	1,067
Yilan County	392,235	±3%	1,064	1,072
Taoyuan County	1,516,186	±3%	1,066	1,066
Hsinchu County	380,546	±3%	1,064	1,068
Miaoli County	474,257	±3%	1,065	1,072
Taichung County	1,271,789	±3%	1,066	1,068
Changhua County	1,109,909	±3%	1,066	1,070
Nantou County	458,452	±3%	1,065	1,076
Yunlin County	629,940	±3%	1,065	1,065
Chiayi County	478,066	±3%	1,065	1,092
Tainan County	951,684	±3%	1,066	1,068
Kaohsiung County	1,060,282	±3%	1,066	1,066
Pingtung County	769,420	±3%	1,066	1,067
Taitung County	205,149	±3%	1,062	1,062
Hualien County	297,657	±3%	1,063	1,069
Penghu County	79,066	±3%	1,053	1,062
Keelung City	335,899	±3%	1,064	1,064
Hsinchu City	318,552	±3%	1,064	1,095
Taichung City	841,985	±3%	1,066	1,070
Chiayi City	226,518	±3%	1,062	1,084
Tainan City	642,804	±3%	1,065	1,065
Kinmen County	53,718	±3%	1,046	1,051
Leinchiang County	8,011	±3%	942	950

III. Research Dimensions and Survey Indicators

Comparing the survey results over the past 2 years, the research dimensions of digital divide in 2005 was basically the same as with 2004. However, new entries like the use of the VoIP Internet telephone were added to reflect the advances of IT development.

The four study categories were formulated as follows: overview of individual use of computers and the Internet, overview of household use of computers and the Internet, basic individual information and basic household information. The individual digital divide was then measured by three primary dimensions, “access to information technology,” “information literacy” and “information application," whereas the household digital divide was measured by two primary dimensions of “information environment in the household” and “information literacy of family members."

The 2005 digital divide survey used various indicators to reveal the Internet use by the population group above the age of 12. The Digital Performance Score for the individual and households that was derived from the cross indicator weighting analysis by AHP was helpful in comparing the digital ability among different groups. To ensure the consistency of the comparison basis, the Digital Score in 2005 was calculated with the cross indicator weighting in 2004. Please see Table 2 for research dimensions, study indicators and cross indicator weighting.

Table 2　Indicators and Weighting Values for Digital Score

I	II	III		Primary Dimension	Second Dimension	Tertiary Dimension	Indicators
Individual				0.602			
Access to Information					0.262		
	Access to information equipment					0.349	
		Ever used a computer					0.413
		History of computer use					0.587
	Access to the Internet					0.651	
		Ever used the Internet					0.190
		History of Internet use					0.268
		Frequency of Internet use					0.542
Information Literacy					0.346		
	Information skill literacy					0.371	
		Ability to use computers and internet					0.304
		Ability to install/maintain/fix computer hardware and software					0.107
		Ability to use e-mail					0.356
		Ability to create web pages					0.233
	Information training					0.236	
		Information technology related training					0.361
		Willingness to participate in computer training					0.639
	Network etiquette					0.394	

I	II	III		Primary Dimension	Second Dimension	Tertiary Dimension	Indicators
			E-mail attachment etiquette				0.458
			Ability to authenticate information source				0.542
Information application					0.392		
	Application at work (or school)					0.362	
			Computer use at work (or school)				0.366
			Internet use at work (or school)				0.634
	Civil activities					0.259	
			Using the Internet to access public notices				0.318
			Making applications through government websites				0.348
			Making appeals through government websites				0.334
	Daily life application					0.379	
			Online selling or purchasing				0.281
			E-banking				0.210
			Information search				0.316
			Online game experience				0.092
			Instant messenger experience				0.097
Household				0.398			
Information Environment in the Household					0.550		
	Household information equipment					0.475	
			number of computers in the household				0.240
			internet connection in the household				0.450
			ratio of family members to computers in the household				0.310
	Household internet setup					0.525	
			type of internet connection in the household				1.000
Information Literacy in the Household					0.450		
			Percentage of computer users in the household				0.415
			Percentage of internet users in the household				0.585

IV. Current Situation of Individual Digital Divide

This study was conducted to understand the Internet use of the population above the age of 12 for the three primary dimensions of “access to information technology,” “information literacy” and “information application.” The results were as follows:

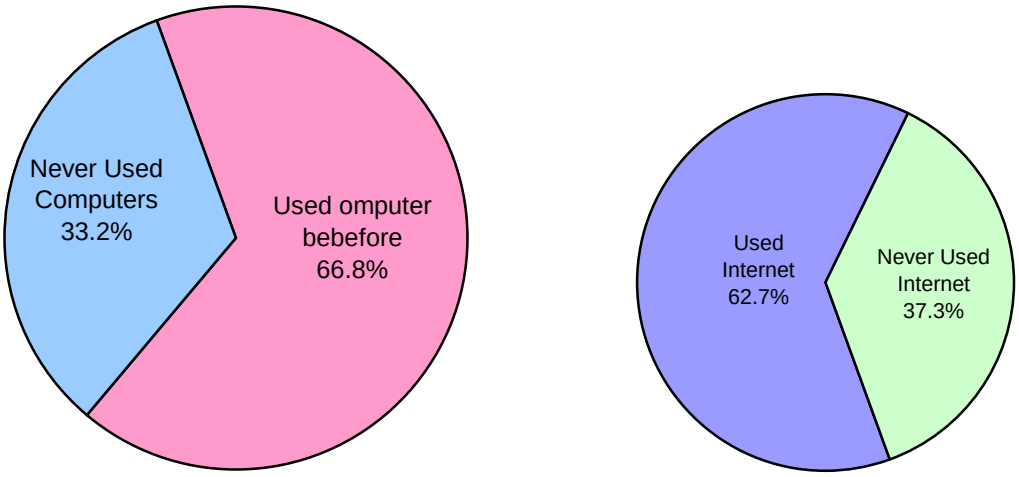
1. Access to information technology

“Access to information technology” uses “Access to Computer” and “Access to the Internet” as the secondary dimension.

(1) By converting the percentage of 66.8%, out of the population above the age of 12 who use a computer, it was revealed that there were 12.9 million computer users, averaging 7.37 years of computer usage per individual user .

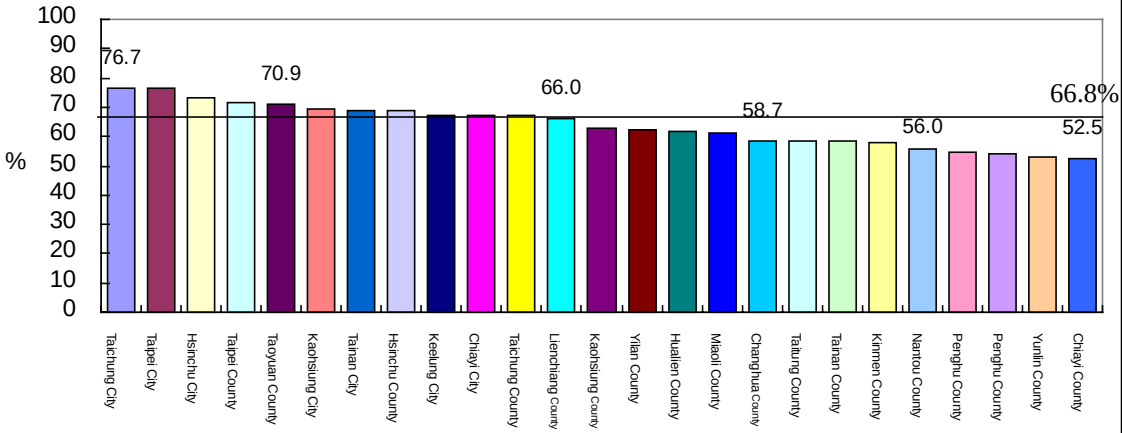
(2) By converting the percentage of 62.7%, out of the population above the age of 12 using the Internet, it was revealed that there were 12.1 million Internet users, averaging 5.96 years of Internet usage for individuals, which was 1.41 years less than the historical average for computer users.

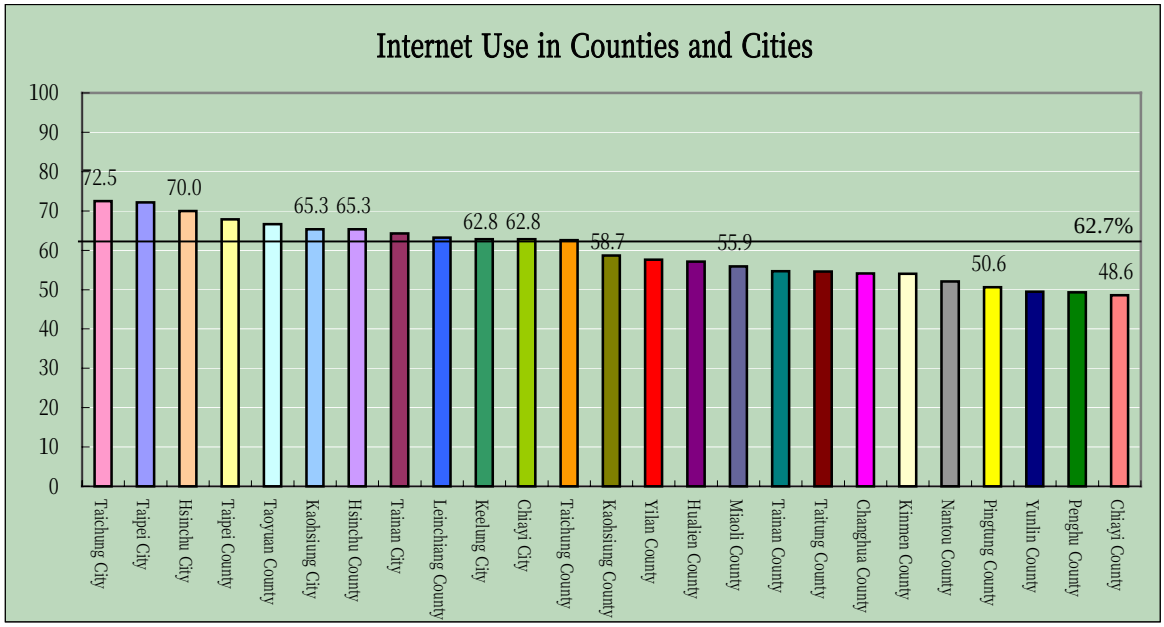
Chart 1 Computer & Internet Use



(3) There were significant differences in the opportunities for access of computers among individuals in different counties and cities. More than 70% of people in Taichung City, Taipei City and Hsinchu City had accessed the Internet previously, making up the highest computer and Internet user rate, while less than 55% and 50% of people in Chiayi County, Penghu County and Yunlin County had access to computers and the Internet respectively, implying the relatively low level of e-learning penetration.

Chart 2 Computer Use in Counties and Cities





(4) The opportunities for people to access information technology vary from the extent of urbanization. The higher the urbanization, the higher the user rate and years of using the computer and the Internet; for example, the computer and internet user rate were less than 52.0% and 48.0% respectively in remote and mountain indigenous regions.

(5) There were significant differences in opportunities for access to information technology among different ages of people. People who were under the age of 40 made up a higher computer or Internet user rate which was above 75.0%. The user rate decreased to, approximately 50% to 60%, for the population between the ages of 41-50, and dropped to below 40% for those who were above the age of 50, defining age as the dividing factor of the digital world.

(6) The access to computer and Internet had a direct positive correlation to the general education background of the population. Those with a college degree or above achieved a computer user rate as high as 95% and above, whereas those who attain only elementary or lower education have a computer user rate of less than 20%.

(7) 61.8% of Internet users have almost daily access to Internet, with an average of 2.26 hours per day, signifying that the Internet plays an important role in modern times.

(8) From the aspects of observation on user location, there were over 95.0% of populations above the age of 12 accessing the Internet from home, 61.9%

accessing from workplace or school, and 43.3% paid for or had free access from public places. Hence, places like the library, museum, etc. may not after all be neglected for public computing other than places at personal (home) and private (work or school) levels.

2. Information Literacy

(1) Skill Literacy

In this study, four indicators were used to observe computer skills of people. They were (a) ability to operate the computer independently, (b) ability of finding solutions to install, maintain, or debug computers, (c) ability to use e-mail, (d) and ability to create web pages.

A. There were 51.4% of interviewees who used computers expressing to be able to access the computer without any assistance, 44.4% of them seek help when needed, and 3.9% needed aid all the way through. However when it came to troubleshooting of computers, 44.9% needed assistance, 43.1% had basic maintenance knowledge, while 11.4% had self maintenance ability and needed no help at all.

B. 85.7% of the computer users know how to use emails, with only 37.3% of them being proficient at it or having basic ability to create web pages.

C. For those who had received a college degree or above, 60% has the ability to independently operate the computer, 70% has the basic knowledge of maintenance for computers, with above 95.9% having the ability to use e-mail, and approximately 10% of master degree holders having the ability to create web pages, all in all making up the highest percentage compared to other groups.

D. Among the various industries, professionals have the highest skill literacy rate, with 65.4% of them having independent ability for computer operation, 71.7% having the basic ability of computer maintenance, 94.5% having the ability to use e-mail and 7.8% having excellent ability to create web pages.

(2) Network Etiquette

Network etiquette was set mainly to understand if the Internet users ever considered E-mail attachment etiquette, and to observe to what extent E-mail users had in network etiquette.

A. 51.1% of the Internet user admitted that they have not considered if the oversized E-mail attachments would cause harassment to receivers, with 26.9% of them forwarding sensational and interesting E-mail that had yet to be verified.

B. 53.1% of the female Internet users did not consider the size of E-mail attachments, with 31.0% of them forwarding unverified E-mail, making them an inconsiderate group compared to their male counterparts. More than 50% of the professionals, technicians and administrative workers have considered their E-mail attachment size, forming the highest percentage as compared to those in the other industries.

(3) Information Training

Information training was the studying of the situation on Internet users participating in computer training over the past year, as well as their desire for participation and acceptance, at their own expenses in the future.

A. There were 16.2% of computer users receiving related information technology training over the past year, and 45.6% were willing to participate in computer training at their own expenses if any appropriate courses were made available.

B. More than 50% of the population in Penghu County, Lienchiang County, Kinmen County and Nantou County were willing to participate in information skill training at their own expense, making up the greatest demand compared to other counties and cities, while no more than 50% of people in highly digitalized cities like Hsinchu City and Taipei City showed willingness to participate in information training.

C. More than 30% of professionals in the educational services industry and public administration received computer training over the past year, achieving the most outstanding percentage as compared to other industries.

On the aspect of employee group, there were more than 40% of those in the civil service receiving information technology-related training over the past year, while only 13.1% of employees in private enterprises received such training over the past year, implying the investment made by the government in e-learning was much more than the private enterprises.

3. Information Application

The survey in 2005 implemented five secondary dimensions to observe the information application situation of the population. They were (a) application at work, (b) civil activities, (c) daily life application, (d) e-commerce, and (e) ability to receive Internet information.

(1) Application at Work (or School)

A. Approximately 78.3% of the population above the age of 12 who were computer users had used the computer at work or school; and 83.9% out of this group had access to the Internet. From this, we can tell that computer and Internet application was very common at work or school.

B. Among the population of computer users in the 25 counties and cities, Taipei City and Hsinchu City (86.3%) had the highest work (school)-related digitalized levels, followed by Taichung City (81.2%) and Hsinchu County (81.0%) which contained more than 80% of population using computers at work or school, while Penghu County (68.1%) had the lowest work-related digitalized levels.

C. Professionals and administrative workers had the highest work-related digitalization levels, which take up 93.6% and 91.4% respectively among all the people in the industries, and over 73.9% of them applying Internet to work. On the aspects of sectors, the public sector had the highest e-transformation levels as 91.4% of the civil service used computer at work and 79.5% of them applied the Internet to work.

(2) Internet Civil Activities

A. More than 83.3% of the Internet users knew that there were government websites. 46.5% of the group had used the Internet to access public notices over the past year, 23.9% had filed applications through government

websites, and 7% had made appeals through government websites.

B. Among all the Internet users who knew about the government e-transformation, those in the two outlying islands, Lienchiang and Kinmen, had the highest rate of using the internet to access public notices, followed by the most computerized cities, which were Taipei City and Hsinchu City. It was also Taipei City, Hsinchu City and Lienchiang County that had the highest rate of applications applied through government websites. On the contrary, no more than 40% of the population in Changhua County and Chiayi County used the Internet to access public notices, making up the lowest rate.

(3) Daily Life Application

A. 88.1% of the population above the age of 12 used the Internet for information search, 67.6% had used Instant Messenger software before, 67.4% used to use the Internet for leisure activities, and 19.6% of the Internet community had used the VoIP Internet telephone.

B. The rate of leisure activities accessed through the Internet by the Internet community in various counties and cities had a reverse correlation to urbanization. About 69% of population in the counties and townships engaged in online game, music listening, etc. The percentage decreases to 65.3% in local cities and 62.4% in metropolitan cities.

C. With the emergence of the VoIP Internet telephone over the past year, Taipei City (28.7%), Taichung City (25.6%) and Hsinchu City (25.3%) had a higher Internet telephone user rate, while Pingtung County had the lowest user rate with only 11.6% of the Internet community having used it so far.

D. The application of use by the Internet community to their life varies with gender and occupation. Male Internet community engaged in leisure activities had a 7% higher rate than their female counterparts. There was also a larger male Internet community than female using the VoIP Internet telephone (21.4%:17.7%). However, when it came to information search, women had a higher user rate than men. Less than 60% of managers and professionals engaged in Internet leisure activities, while more than 90% of them used the Internet for information search, and about 30% had used the VoIP Internet telephone before.

(4) E-Commerce

A. E-commerce was still not popular, with only 18.5% of the Internet community having used e-banking before, and 37.2% having used online selling or purchasing for products or service.

B. Safety and privacy were still the main reasons that scare the public away from e-commerce (28.2%). 24.9% of the population preferred the traditional way of trade - seeing the goods, yet 12.9% was worried that it was inconvenient to return or replace goods with online purchasing. 17.0% did not have the need to purchase, and 6.0% complained that the complexity of online purchase procedures and processes was the reason that puts them off. Other reasons made up for less than 5%.

C Among the Internet community with different educational backgrounds, over 30.1% of the population who was educated above the university level uses e-banking, with more than 50% of them purchasing online, making up the best e-commerce-accepting groups.

D. Among all industries, professionals accepted e-commerce best, with 32.0% of them having used e-banking before and 51.3% online trading. Moreover, the higher the income of the Internet community, the higher the user rate of personal e-banking.

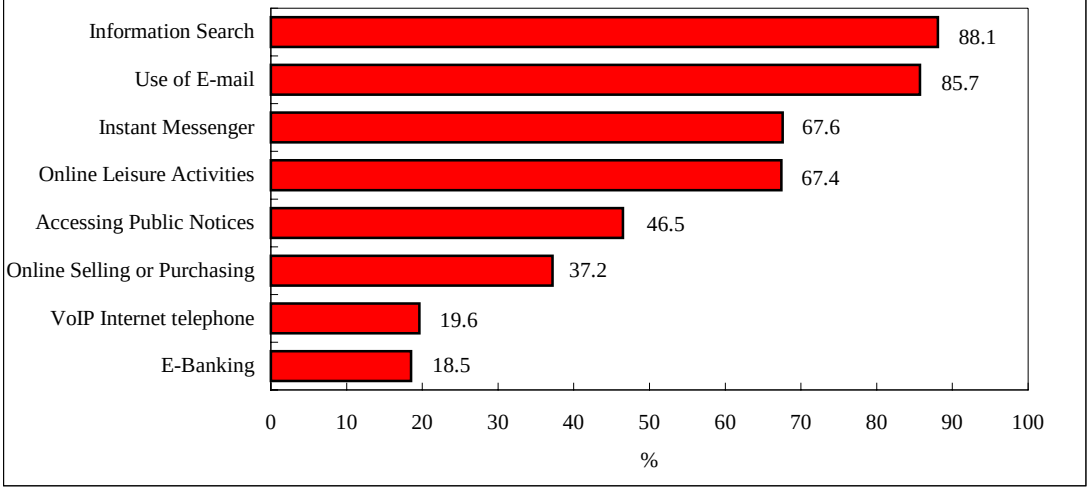
(5) Ability to receive Internet Information

A. Up to 74.1% of the subjects knew how to download and install software on the Internet. Besides that, there was a total of 79.0% of them who had the ability to search for specific information. However, the survey shows that poor English ability can be a hidden worry for the Internet community. There was 63.9% of the Internet community believing that they were incapable of reading English web pages.

B. The ability of the male internet community to receive information was more superior compared to the female community. Among the Internet community with different educational backgrounds, more than 89% of the population above the university education level sees themselves with the ability to search for specific Internet information, with 84.1% having the

ability to download and install software. The comprehending rate for English web pages was higher than Internet communities with other educational backgrounds.

Chart 3 Internet Application Status of Internet Users



V. Current Situation of Household Digital Divide

The current situation of household digital divide was discussed based on the two primary dimensions: “information environment in the household” and “information literacy in the household”.

(1) Information Environment in the Household

A. There were more than 79.5% of households having computer setup, with an average rate of 1.39 of computer ownership per household. If only households with computers were taken into consideration, the ownership would be averaging 1.75 computers per household

B. There were significant differences in the computer ownership among households in the 25 counties and cities. More than 85% of households in Taipei City, Taichung City, and Hsinchu City had computer setups, which made up the greatest number in computer ownership compared to other counties and cities, implying a trend of "the rich becomes richer.” On the other hand, Yunlin County, Pingtung County, Penghu County, Taitung County and Hualien County having lower levels of e-transformation with less than 70% of households averaging 0.97 to 1.15 computers per household having computer setups. The household average was relatively

low compared to others.

C. The household computer setup had a direct positive correlation to urbanization. Areas with less computer setup were mountainous regions and townships (51.1%), followed by remote townships (65.0%) and hillside townships (65.6%).

D. The percentage of computer ownership with household income of no more than NT$20,000 was 25.6% and increases dramatically to 62.3% for households with income between NT$20,000 – NT$30,000. However, it was still far below the national average of 80% computer ownership, which defines NT$30,000 as the dividing factor for computer purchases.

E Seven out of ten households had Internet connection (70.6%), among which 72.5% had broadband connection while only 10.9% used dial up.

F. Among all 25 counties and cities, more than eight tenths of the households in Taipei City had access to the Internet, taking up 81.9%. Following on next are Hsinchu City, Taichung City and Taipei County, achieving more than 75% of Internet access. Compared to the high Internet connection rate of above mentioned cities, no more than 55% of the household in Chiayi County, Taitung County and Yunlin County had Internet connection, implying significant difference between counties and cities.

G. Looking from the aspect of the degree of remoteness of the living areas, it drew the same conclusion of “the more remote the regions were, the lower the Internet connection." The percentage of household internet connection in high urbanization cities like Taipei City was 82.1%, while there was only 39.6% and 52.8% in mountainous townships and remote regions.

H. The percentage of internet connection with household income of no more than NT$20,000 per month was only 17.3%. It increases dramatically to 50.6% with household income between NT$20,000-30,000 per month, but it was still 20% lower than the overall average. More than 90% of the households with income above NT$90,000 monthly had internet connection, with more than 80% of them had broadband connection.

(2) Information Literacy in the Household

A. The monthly average expense and consumption on information equipment for household with computers was NT$1,712 (USD 52). 28.2% of them spent no more than NT$1,000 on information technology per month, 27.5% spent between NT$1,000 – NT$1,999, and 13.1% spent NT$2,000 – NT$3,999.

B. From the perspective of urbanization, the average monthly expense for households in Kaohsiung City was NT$1,662 only, which was not only lower than Taipei City (NT$1,841), but also lower than commercial towns (NT$1,720), emerging towns (NT$1,776) and integrated towns (NT$1,685). Besides, Kinmen and Matzu areas spend up to NT$1,980 on information technology, which was obviously higher than counties and cities island. The consumption mode for households did not follow the pattern of “the more the urbanization, the more spending on information."

C. Approximately 60% of household members Area had the ability to use computer, and 50.5% of them used computer “at home” while 8.1% did not use computer at home.

D. Among all 25 counties and cities, household members in Taipei City, Taichung City and Hsinchu City had higher computerization, with more than 66% computer users in the household, and more than 63% knew how to use the Internet. On the country, no more than 50% of household members in Chiayi County, Yunlin County, Kinmen County, Tainan County, Pingtung County, Penghu County, Taitung County and Nantou County knew how to use computer and internet.

VI. Analysis of Non-Users of Computers & Internet

1. The survey revealed that for the population above the ages of 40 years old or with education below the high school level, most of them did not have the knowledge to access the Internet. Where the geographical location aspects were concerned, more than half of those who did not know how to use the computer were living in less urbanized “towns” or “villages.”

2. “No necessity (46.5%),” “did not know how to use (30%)” and “no time (9.5%)” were the three main reasons why they had not gone on the internet. The other

reasons such as inability to afford the computer setup, internet connection charges, etc. make up for less than 5%.

3. Among the population who did not know how to use computers, around 18% would like to learn how to use computers. There were about 1.18 million people out of the population above the age of 12 years old who would like to learn how to use computers, according to calculations.

4. Presently, among the population who "did not know how to use computers but had the desire" as well as "know how to use the computer but did not know how to get on the internet," 64.2% wish to further learn how to get on the internet, but there were also 33.4% who had no interest to get on the internet, with 2.4% with no opinions. With this calculation, there were about 1.09 million people who wish to learn how to get on the Internet.

5. 33.2% of the population did not know how to use the computer, 4.1% ever operated a computer but did not know how to get on the internet, and however, this did not mean that these two groups of non-users of computers and internet were unable to enjoy the convenience brought by the digital life. This study adopted the Bakardjieva's notion of the "information agent'" and discovered that, among the population who did not know how to use the computer or internet, out of every four person, one would inquire internet information through the family members, thus enjoying the convenience brought by digitalization through their family members.

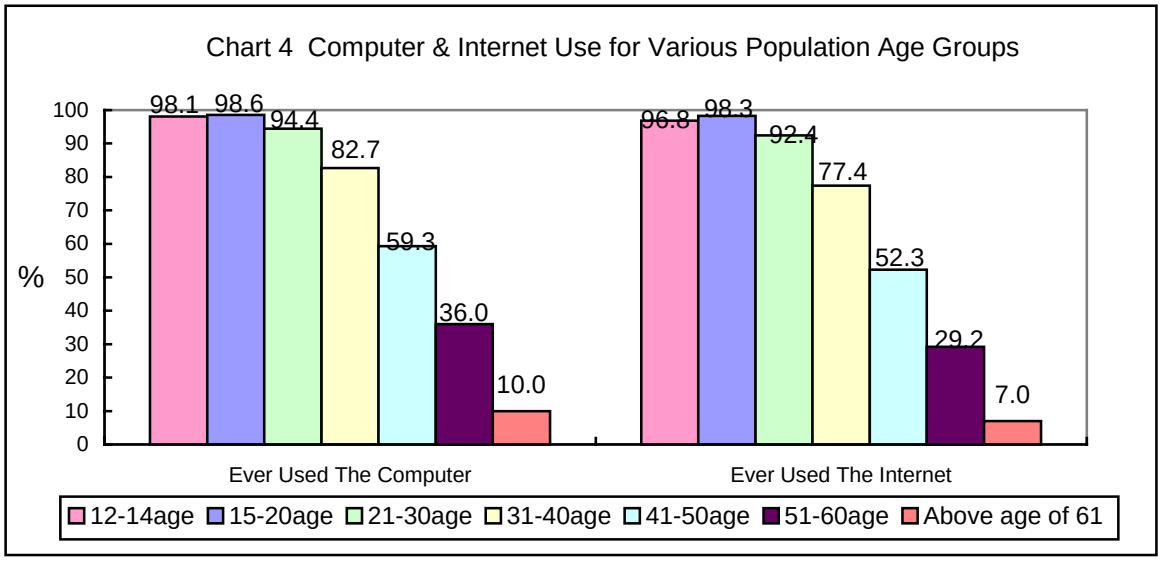
VII. Analysis of Digital Barriers Facing the Middle-Aged, Elderly, Agricultural, Forestry, Fisheries and Livestock Population

1. This study uses the term "Digital Divide" to broadly indicate the divergence in the proximity usage of computer setups and application of internet activities, while the digital barriers was used to emphasize the extremely critical digital divide across community boundaries.

2. The survey had shown that regardless of the access to computers, internet or digital abilities, as the age of the user increases, the frequency of usage and digital ability gets lower. For the users below the age of 40, their user rate was over 80%, and the subjects below 30 years of age achieved an even greater 94% and above. For the middle-aged and elderly population who ever used a computer, the user rate did not even hit 60%, and for the population above 61 years old, only 10

percent had the experience of using a computer before, forming the boundaries of digital barriers.

3. On the situation of access to information technology and computer usage, the percentage of middle-aged and elderly population who ever used the internet did not exceed 52%, with only 7.0% of the population above the age of 61 years old ever used the Internet. Whereas the survey subjects below the age of 40 years old who had the experience of using the internet before constitute 77%, more than 90% of those below 30 years old had surfed the Internet before.



4. Among the population who did not know how to use the computer, 12-14 years old youth had the greatest learning desire (41.0%). The desire among the middle-aged and elderly population was pretty low, where there were only over 20% of the 41-60 years old population who wished to learn to use the computer, with only 5.9% of the non-computing community above 61 years old wishing to learn computer.

5. The population had ever used the computer or internet amounted to 60%, with the agricultural population only having 10+ % in the same category; making them the most seriously digitally divided professions among all. To further look into the internal divergence of the agricultural profession, those in the agricultural industrial sector (13.8%) was lower than the forestry industry (23.9%), fishing industry (22.3%) and livestock industry (23.1%). The rate of internet use for those in the agricultural industrial sector (11.0%) was also significantly lower than the forestry industry (20.5%), fishing industry (17.5%) and livestock industry (20.2%),

making them the most seriously digitally divided industrial sector.

6. The regression analysis also discovered that the main reason of the digital divide phenomenon in the agricultural industry was because those in the industry were mostly made up of people that are older and with lower education, and not due to characteristics of this industrial sector.

VIII. Comparison of Individual and Household Overall IT Performance Scores

1. Individual Digital Score

(1) This survey utilizes many different indicators for the population group above 12 years old, to gauge on their usage. Through the various cross indicators weighting from the analysis by the AHP method, the calculation of the overall digital score for all areas can be derived instantly. The survey discovered that at the individual level, the population above the age of 12 years old had a digital score of 35.9 points, among which the access to information technology dimension was the highest (46.8 points), followed by information literacy (33.5 points) and information application (31.4 points), showing that even though the population had much opportunities being in contact with computers and the Internet, but there was still much room for improvement in information application and information literacy abilities.

(2) The digital abilities for the different unique background groups 12 years old and above population, had a degree of divergence, among them, the overall digital score for males stands at 37.9 points, which was 4.1 points higher than females. For the population with different education level, the digital development divergence was great, where the studies showed that for the population with a master's degree or above, the overall digital score was 68.9 points, while 0.2 points for the illiterate population.

(3) Among the different age groups, the digitalization for 15-20 and 21-30 years old population was rather equal, with the respective overall score at 57.1 points and 56.1 points, at the head of the population group. Those above the age of 40 years old were facing a serious digital divide situation, where 41-50 years old population stands at 28.1 points, 51-60 years old and above 61 years old population standing at 15.0 points and 3.2 points respectively.

(4) Regarding the areas of job professions, the digitalization for professionals stand right at the top (63.2 points), followed by administrative workers (58.7 points). On the other hand, the status of digitalization for labor and agricultural workers were far from ideal, standing at a lowly 30 points, among which those in the agricultural industry had the most serious digital divide phenomenon (5.7 points).

(5) For those in the government sector, the overall digital score stood at 59.9 points, far exceeding those in the private sector.

(6) The average digital score for indigenous peoples was 21.2 points, significantly lower than the Hakka population (35.7 points) and non-indigenous and non-Hakka population (36.5 points), and the digitalization for the disabled (between 16.6 points to 18.8 points) was also much inferior to the non-disabled population (37.0 points), with its average score not even half of the latter.

(7) For the differences between areas, looking at the overall picture, Taipei City (43.8 points) had the highest digitalized population level for all counties and cities, followed by Taichung City (42.4 points) and Hsinchu City (41.9 points). The counties and cities with poorer digitalization with an average score between 25.9 points to 27.7 points, includes agricultural counties like Chiayi County, Pingtung County, Yunlin County, Penghu County, etc.

(8) The information application situation in all areas and villages was still roughly in direct proportion with urbanization, with Taipei City’s digital development the highest (43.8 points), followed by townships (40.3 points) and Province-controlled cities (39.5 points) taking second spot. Kaohsiung City, emerging towns and diversified towns, made up the third leading group, followed by the development of service-oriented towns and offshore island towns taking fourth spot. Lastly, the digitalization development of towns and villages in remote and mountainous regions was the weakest.

2. Household Digital Score

(1) As a whole, household digital score of 53.5 points, among which the primary dimension of the information environment scoring 59.8 points, surpassing the household information literacy score of 45.8 points.

(2) From differentiating the society status of the principal income earner in the household, the score (78.9 points) for households with students being the highest, followed by the educational service industry (73.5 points) and in turn, professional, scientific and technical services industry (72.0 points); In comparison, where the main source of income was weaker in the agricultural, forestry, fishery, and livestock industries, retirees, housekeeper or unemployed, the degree of household information was significantly disadvantaged.

(3) On the aspects regarding the position of the income earner, white collar professionals had a certain degree in household digitalization, scoring between 55.8 points to 72.7 points. The households with the main income earner in agricultural, forestry, fishery, and livestock industries or non-economically active population had the lowest score between 28.7 points to 30.0 points.

(4) From the aspects of the professions of the main income earner, the household digitalization for those employed by the government (69.5 points) and employers (67.8 points) significantly surpasses the privately employed (58.0 points) as well as the self-employed (49.3 points).

(5) For households with monthly income not exceeding $30,000, the digitalization would be weaker, scoring between 14.6 to 37.7 points, indicating that the income situation would have an effect on degree of digital learning and applications on family members as a whole.

(6) The digitalization development for households with disabled members (49.0 points) and the households with foreign spouses (36.4 points) was apparently weaker, with the digital divide situation being more serious for households with foreign spouses.

(7) On the aspects of geographical differences, the digitalization was the highest for Taipei City (64.2 points) and Taichung City (62.6 points), whereas Yilan County, Miaoli County, Changhua County, Yunlin County, Nantou County, Chiayi County, Tainan County, Kaohsiung County, Pingtung County, Penghu County, Hualien County, Taitung County and Kinmen County had unsatisfactory scores lower than 50 points, where Chiayi County households had the lowest score (38.9 points).

(8) The information application for villages and towns was roughly proportional to the urbanization, with Taipei households digital development being the highest,

commercial townships (60.0 points) and local cities (58.6 points) coming in second, followed by Kaohsiung City and emerging towns, the third placing groups. The digitalization development for villages and towns in remote and mountain indigenous regions was the weakest with the respective score of 37.5 points and 29.2 points.

3. Overall Individual & Household Digital Score

(1) The cross indicator weighting of the individual and household digital score discovered that, the overall digital score for all scored 42.9 points, which the standard deviation is 28.8, indicating that the digital development divergence for different community groups was great.

(2) The overall digital score for males was 44.2 points, which was 2.7 points more than females, with the overall digital score rising as the education level goes up. The overall digital score for the population group with a master's degree or above stands at 72.7 points, which was 25 times that of the illiterate population.

(3) Amongst the various age groups, the overall digital score for the population between 15-20 and 21-30 years old was 61.7 points and 60.2 points respectively, which puts them at the top of the age rankings, while for the age group above 51 years old, the score was not even 30 points.

(4) The overall digital score for the indigenous peoples averages 25.7 points, apparently not comparable to the Hakka population (42.9 points) and non-Hakka as well as non-indigenous population (43.6 points). The digitalization for the handicapped population was also lagging behind the non-handicapped population.

(5) On the aspect of county-city gaps, the digital score for Taipei City (51.9 points) was the highest, followed by Taichung City (50.5 points) and Hsinchu City (49.7 points). The weaker digitalized counties and cities were mainly Chiayi County and Yunlin County, averaging 31.1 to 32.1 points.

IX. Comparison of the Digital Divide Phenomenon Trend in the Past 2 Years

1. Comparison in Individual Access to Information Technology

The survey in 2004 revealed that, the ratio for the population of 12 years old and

above that had ever used a computer stands at 68.2%. The survey this year indicated that 66.8% of the population had used a computer, showing a slight decrease compared to the previous year; however, the difference had occurred within the acceptable limits of the sampling error. As for the access to computer, the population above 12 years old who ever used the Internet had a slight increase from 61.1% to 62.7%, also within the limits of sampling error. The statistics indicated that the access to information technology had no significant transformation in the past year.

Table 3 Comparison in Assess to Information Technology for Population Above the Age of 12 for the Past 2 Years

	2004	2005
Computer User Rate	68.2	66.8
Internet User Rate	61.1	62.7

2. Comparison on the Rates of the Various Functions Used by the Internet Population

The studies conducted in 2004 and 2005 indicated that, for the internet community above the age of 12 years old, the using of E-Mail was very common, with the respective percentages being 86.9% and 85.7%. The internet community had shown no obvious changes in the use of internet for leisure activities, daily life information search or using E-banking for the current and previous year.

However, in the past year, the use of instant messenger software had leaped by 11.4%, adding up to 67.6% of the internet community using instant messenger software to communicate with friends and relatives, and the rate of online purchasing had also significantly grown, where what used to be 30.4% of internet transactions by the internet community had now grown to 37.2%.

Table 4 Comparison on the Usage Situation by the Internet Community above the Age of 12 for the Past 2 Years

	2004	2005
Use of E-MAIL	86.9	85.7
InternetLeisure Activities	67.3	67.4
Information Search	85.4	88.1
Instant Messenger	56.2	67.6
E-banking	18.1	18.5
Online Purchase	30.4	37.2

3. Integral Digital Score Changes of Trend for Individuals/Households

(1) Comparing the conditions of change for the individual digital development, the survey had shown that, the individual digital score had slightly dropped from 36.8 points to 35.9 points. From the changes in the 3 primary dimensions, it can be discovered that the performance of the digital score had dropped slightly by 0.9 points, chiefly due to the drop in information literacy from 36.8 points to 32.7 points, with the score for the access to information technology and information applications raised from the previous year.

(2) Analyzing the reasons for the drop in information literacy in 2005, it had to be due to the common practice of the population forwarding yet to be verified E-mails (increase from 18.1% to 23.1%), as well as the drop in rate in consideration of attachment size (53.9% dropped to 39.9%), thus causing the network score to decrease.

(3) Due to the slight decrease in the percentage of households having a computer from the previous year, the for the information environment in the household had also dropped slightly from 61.7% to 59.8%, indirectly affecting the household digital score to drop slightly from 54.3 points to 53.5 points.

(4) Affected by the effect of the slight drop in individual and household scores, the overall digital score had dropped slightly from 43.7 in 2004 to 42.9 in 2005.

X. International Comparison

It can normally be separated into two main types when probing into the topic of “Digital Divide:” the first type being the discussion of divide between different community groups domestically, and the second being the divide between countries. This study was aimed at the phenomenon of the digital divide between different unique background population groups for discussion. For the latter, the digital divide differences between countries had been deemed to be caused by poverty and slow development in the country, and they had to rely on the digital divide statistics circulated by various countries before further comparisons can be done.

However, due to the survey time, scale, sampling method, as well as subjects of the various countries having their respective differences, adding with the assembled current situations and language barriers pertaining to the policies of digital divide in the various countries, thus when the respective countries or research organizations

had yet to translate their related studies into English, and placed it on their official web pages or publications, it is difficult for the assembled data to be comprehensive. This was the restriction that had to be specifically noted before analysis of the comparison in digital divide levels between different countries, comparatively, the related neighboring and major Euro-American countries. The digital divide in Taiwan had the following features:

1. Broadband coverage had reached 98.96%, broadband user numbers stood at number ten in the world, and digital infrastructure was significantly ahead of other countries.

2. The percentage of computers in the households had reached 79.5%, with internet connection in the household being 70.6%, achieving a 3-5% higher rate than Korea and Singapore, as well as surpassing the averages of America, Finland and European Union countries.

Table 5 Comparison of Household Computer Ownership & Internet Connection in Different Economies

	Year of Study	Household Computer Ownership Rate (%)	Household Internet Connection Rate (%)
Taiwan	2005	79.5	70.6
USA	2003	61.8	54.6
Korea	2004	77.8	66.9
Singapore	2004	74.0	65.0
Finland	2004	68.0	56.0
EU Countries (average)	2004	--	47.0

3. Taiwan's individual access to information technology was significantly lower than America and Korea, roughly similar to Japan, slightly ahead of Singapore. As for comparison with EU countries, due to the major gaps in their respective economic development, the rate of individual access to information technology was higher than the EU averages.

Table 6 Comparison of Individual Access to Information Technology for Different Economies

	Year of Study	Population	Individual Access to Information Technology Rate (%)
Taiwan	2005	Above age of 12	62.7

	Year of Study	Population	Individual Access to Information Technology Rate (%)
USA	2003	Above age of 12	75.9
Japan	2003	Above age of 13	60.6
Korea	2004	Above age of 6	70.2
Singapore	2004	Above age of 15	57.0
EU Countries (average)	2004	Above age of 16	47.0

XI. Recommendations

Despite indicative results of the survey on the digital divide conducted with individuals/households in 2005 showed that Taiwan'sdigital had been comparable to the developed countries in Europe and America, the access to information technology and digital capabilities of its population had obviously diverged among different education levels, age groups, professions and industry groups, and thus leads to an emergence in significant level of digital divide between cities/counties and regions, where there is plenty of room for government action.

Presently, the main problem of access to information technology lays with the low education, old age groups in their weak learning desire or incapability, and comparing with the 2002 study indicating that "the problems of access to information technology faced by domestic general population was mainly on computer setup and the burden of cost for internet access, the quality of internet connection and insufficient bandwidth as well as public places of access," there is slight difference (Zhen Shu-fen, 2003). Recommendations provided by the study for the government on its policy on closing the digital divide are as follows:

1. Providing More Living Related Information

The 2005 study results indicated that the digital divide for those aged 40 and above, low education level, agricultural workers or retirees, low urbanized villages or mountainous regions and households with disabled members, were most obvious. More than half of these information segregated parties had mostly not used the computer or internet because of, "no needs (46.5%)," "inability to operate (30.0%)" and "no time (9.5%)," with only a very small percentage incurring segregation because they are unable to afford the access or internet charges.

Should the government wish to involve the abovementioned groups in using

information technology, it was necessary to develop the “Bottom-up” strategy, directed at the characteristics of the information segregated parties and implement the “correct remedy” for those who had not used the computer. Besides providing the appropriate computer training, it was necessary to have topics even more related to the living of the segregated parties in its information providing services, as well as strengthening of its publicity notices, to further their motive to use information technology.

2. Developing Computer Systems and Equipment Suitable for the Middle-Aged and Elderly

There were some illiterate senior citizens domestically, adding on to the fact that these old folks were not as agile as young people, and thus there was already certain difficulties for them to operate the computers presently sold in the market. To encourage the middle-aged and elderly folks and low educated public to bravely use the computer, the government was relied upon to provide the necessary funding or urge the public organizations to develop suitable hardware such as picture or voice forms of computer system, large screen monitor, big computer mouse and large keyboard, suitable for the use of the middle-aged and elderly folks.

Subsequently, with the daily advancement in technological developments, the cognitive ability of those from all walks of life was not only restricted to “computer.” For example, the penetration rate for cable TV in households of different counties and cities had reached over 85%, and the mobile phone ownership of the population was common, so perhaps in the future, it was possible to teach the middle-aged and elderly folks to operate a remote control and enjoy the convenience of the Internet through cable TV.

3. Promoting the Concept of Household “Information agent”

Due to the middle-aged and elderly population’s unfamiliarity towards new technology, even though it might be through suitable contact channels, providing suitable learning materials and hardware equipment, it might not necessarily raise their information acceptance level.

However, from the survey results of this year, there were 25% of the current information segregated parties who would actually use the internet to look for needed information, purchase and appoint registration, through the help of family

members. This indicates that if the information agent can fully fulfill the function (besides helping to inquire, it can also play the role of an active information teacher, teaching family members to learn computing), handily letting those who were not digitally inclined to enjoy the convenience of the information society, to promote the development boundaries of household “Information agent” or “Household Information Teacher,” which may after all be the effective shortcut solution for the digital divide among the middle-aged and elderly population.

4. Mapping out the E-Transformation for Private Enterprises, and Opening Government Digital Resources for the Private Sector

The surveys conducted in 2004 and 2005 indicated that whether it was for access to information technology or acceptance of opportunities for information training, government departments had achieved further than public establishments. Excluding professional scientific and skilled services industries as well as financial and insurance industries, the rest of the agricultural, utilities, manufacturing, hospitality and food & beverage professions had made limited inroads towards e-transformation, revealing that there was still a huge divergence in the e-transformation of industries .

In the circumstances of revolving business organization structure and globalization, in view that e-transformation was still the key in elevating competitiveness, thus besides promoting e-commerce, the government should more actively draft out an overall guidance plan for its enterprise e-transformation policy, assisting enterprises in raising their e-transformation application abilities, as well as considering free up the digital resources (such as the Internet E-Learning College) and experience from its related departments, to be shared with the private enterprises. And also to let all the enterprises and working adults with the respective desire to e-transform and learn, had a share of the curtailing digital divide achievements in recent years, maximizing the benefits of government resources.

5. Promoting Internet Security Technology and Encouraging Internet Citizen Participation

In the various information application services, the acceptance level by the public on ecommerce was still not high, only 18.5% of the Internet community had handle their personal finance through the internet, while 37.2% had done online selling or purchasing for products or services on the Internet. Top of the

underlying reasons had been security and privacy concerns, thus to step up the development of ecommerce, carry on research and promotion of internet security technology, and strengthen educational work on the merits of ecommerce as well as the security controls, which were necessary to reduce the doubts of the public.

Besides, since 1995 when our government started setting up the window of internet services, the “e-government” has been an actively promoted policy. With its development till today, the achievements of our domestic e-government had been relatively outstanding by international standards.
However, the public user rate of the e-government services had been low; for those users who know of the website set up by the government, 46.5% had inquired about government policy and public notices through the Internet in the past year, 23.9% had made online applications through the internet, and only 7% ever posted suggestions or lodged complaints through the e-government website. It thus presents the illustration that with a higher education level, the Internet community’s participation would be more enthusiastic.

The above results revealed that the present domestic Internet had been unable to provide the underrepresented population group with an venue to speak up, but, in retrospective, given the high education level and younger population group further opportunities of conveyance. Because of this, the government had the need to strengthen promotion, to let the people know adequately the uses of e-government, and at the same time, build up the consciousness of being an internet citizen among the people.

6. Providing Computers and Internet Access Assistance to Economically Disadvantaged Households

The survey in 2005 revealed that despite the continuous avocations of the government in the “Computer Recycling and Free Redistribution Plan,” comparing to Korea’s 5 years, 820,000 recycled computers free redistribution plan, the domestic free redistribution of 30,000 computers to improve information environment in the households of the economically disadvantaged as well as their computing abilities had not been significant. The government may consider providing special funding, aimed at households with monthly incomes lower than NT$20,000, indigenous households, the disabled as well as those with foreign spouses, and the other extremely economically disadvantaged households (especially for students who came from such backgrounds), and provided the funds to assist with the purchase of computer and internet charges, to prevent

digital divide from widening.

7. Working with Local Governments to Formulate Digital Divide Reduction Plans with Local Features

Studies had revealed that the problem of digital divide was closely affected by the geographical composition of the population; for example, in Chiayi County, Yunlin County and Penghu County, where the aged and agricultural population was large, regarding the digital divide originating reasons and solutions, the problems faced are probably different from those of counties and cities with many mountain regions. The central government should try to unite all the local governments, focusing on the population composition situation and formulating different plans for closing the digital divide, so as to effectively curtail the gaps among those counties and cities.

Part Ⅱ The Digital Divide of Physically and Mentally Disabled

I. Introduction

Since 2001, the Research, Development, and Evaluation Commission (RDEC) has consistently conducted digital divide studies on an annual basis. It is hoped that through the use of modern social science research methodology, and digital infrastructure implementation the effectiveness of bridging the digital divide can be evaluated.

Due to the revelations of previous studies indicating the fact that disabled individuals or households were usually the weaker groups in terms of their digital score, thus the digital divide study conducted this year has specifically designated the subject of "Digital Divide for Physically & Mentally Disabled Population," hoping that through comprehensive research design and a wider sampling size, we can achieve a deeper understanding on the state of access to computer and information applications by the disabled population. Concurrently, this will also help to further appreciate their digital life and need for web accessibility, as well as adapting these results for references in the government's furtherance of its web accessibility policy.

II. Study Methodology

The population of this study included eight classifications of disabled, such as vision disabilities, hearing mechanism disabilities, voice or speech mechanism disabilities, limbs disabilities, suffering facial damage, and stubborn epilepsy, to name a few. The sampling list was handed over to the RDEC by the Department of Social Affairs in the Ministry of Interior and, subsequently, the interviews were conducted by the Survey Research Center of UDN on individuals chosen from the list of eight classifications of disabled provided.

According to the statistical data provided by the Department of Statistics in the Ministry of the Interior, the various classifications of disabled currently stands at 923,497 for the second quarter of 2005. The population of this survey would be at 635,746, if including only the eight classifications of disability as study subjects (including vision disabilities, hearing mechanism disabilities, voice or speech mechanism disabilities, limbs disabilities, suffering facial damage, and stubborn epilepsy, among others). As for the disabled above the age of 12, the total

population was at 619,318.

This study resulted in at least 384 random sampling copies returned effective, which were within ± 5 percent margin of error for each type of disabled population. Considering that the population for balancing mechanism disabilities and stubborn epilepsy were only at 1,000 each, consequently 384 effective copies were set as the bare minimum for vision disabilities, hearing mechanism disabilities, voice or speech mechanism disabilities, limbs disabilities and suffering facial damage; and the effective copies for the balancing mechanism disabilities, stubborn epilepsy and multi-disability were set according to their actual situation at the point of contact, with the total copies for the eight classifications of disability population being at least 2,688.

The survey was conducted through both mail and telephone, depending on what the disabled interviewee felt most comfortable with. For example, those who were hearing mechanism disabled, or voice or speech disabled, it was obviously inappropriate to interview them through the telephone, with the mail survey being the main option. For those who were vision disabled, balance disabled, limbs disabled, suffering facial damage, stubborn epileptic and/or had multi-disability, they were primarily interviewed through the telephone, with mail survey being the assisting option.

The study was conducted from the evening of June 1, 2005 through to July 8, 2005, returning 2,703 effective copies in total (due to the longer time involvement for return of the postal survey). The statistics for the random sampling and actual distribution are shown in table 1.

Table 1 Distribution of Samples by Eight Classifications of Physically & Mentally Disabled

Classifications	Eight Classifications of Disabled age 12 and above		Valid Sample	
	N	%	N	%
Hearing Mechanism Disability	**96,080**	**15.51**	**387**	**14.32**
Vision Disability	**47,694**	**7.70**	**400**	**14.80**
Suffering Facial Damage	**2,865**	**0.46**	**412**	**15.24**
Limbs Disability	**378,723**	**61.15**	**388**	**14.35**
Voice or Speech Mechanism Disability	**10,276**	**1.66**	**386**	**14.28**
Balancing Mechanism Disability	**1,141**	**0.18**	**113**	**4.18**
Stubborn Epilepsy	**1,518**	**0.25**	**285**	**10.54**
Multi-Disability	**81,021**	**13.08**	**332**	**12.28**

Grand Total	**619,318**	**100.00**	**2,703**	**100.00**

In order to derive a conclusion from the views of the eight disabled classifications, the data from the effective copies needed to be applied through the cross indicator weighting in order for the results to correspond to the sampling data. The sampling model structure was established according to the directive publicized by the Ministry of the Interior in June 2005 , applying the cross indicator weighting on the various aspects of gender, age and disabled classifications for the disabled population above the age of 12.

III. Analysis of Individual Digital Divide for the Physically & Mentally Disabled

In order to compare the “Study of Individuals & Household Digital Divide” with the survey of the disabled population’s “Study of Digital Divide Situation,” the procedural format and terms in the survey of “Study of Individuals and Household Digital Divide 2005” were amended accordingly, as well as adding on new entries such as the recognition towards the convenience of digital life and needs for digital facilities. This study used the four primary dimensions of “Access to Information Technology”, “Information Literacy”, “Information Application” and “Feedback from Convenience of Digitalization,” to understand the computer and the Internet use of the disabled . The results were as follow:

1. Access to information technology

The study revealed that 25.5% of the disabled had the ability to use a computer, while 74.5% of them were not able to, averaging 6.95 years of computer usage per disabled individual. About 80% of the disabled who had the ability to use a computer owned their own personal computer (80.1%), whereas 19.9% of them did not own any computer.

Only 20.5% of the disabled had access to the Internet, while 79.5% of them have never accessed it. As a whole, the average Internet usage per disabled individual was 5.51 years, with an average of 2.03 hours per day.

The five main reasons for disabled who had the ability to use a computer but did not own any computer facilities were: inability to afford the computer setup costs (37.2%); no necessity (32.4%); accessed computers elsewhere (10.7%); constraints of physical condition (4.7%); and lack of specifically designed computers (1.9%).

2. Information literacy

A. 53.4% of disabled computer users expressed the ability to access the computer without any assistance; 39.5% of them sought for help when needed; and 7.0% needed aid all the way through. However when it came to the troubleshooting of computers, 60.0% needed assistance, 26.6% had basic maintenance knowledge, only 13.2% had self maintenance ability.

B. 71.5% of the disabled, who had previously used a computer, knew how to send email. As for the ability to create web pages, nearly 70% of the disabled considered themselves as being unable to (68.3%), with 27.7% having basic ability while only 3.9% of them were proficient at it.

C. Further studies revealed that among the disabled who are male and had received education above the technical academic level, more than 60% of them had the ability to used computers and the Internet independently, more than 40% had the basic knowledge of maintenance for computers. In addition, 27.8% of master degree holders had the ability to create web pages, making up the highest percentage as compared to other groups.

D. 44.7% of the disabled who had access to the Internet did not consider if the oversized e-mail attachments would cause problems for recipients, with 78.5% of them forwarding sensational and yet-to-be-verified or interesting e-mail for the reference of others.

3. Information application

A. 59.7% of the disabled who are currently employed or are students had used a computer at work or school, and 54.6% of them have access to the Internet.

B. Above 70% of the disabled who had access to the Internet knew that there were government websites (75.8%). 46.5% of this group had used the Internet to access public notices over the past year, 28.1% had made applications through government websites, and 11.6% had made appeals through government websites.

C. Out of 77.8% who had access to the Internet and used it for information search, 49.8% of them had used Instant Messenger before, 58.3% had used the Internet for leisure activities, and 18.9% of the disabled Internet users had used the VoIP Internet telephone, which became popular since last year.

D. E-commerce was not popular with the disabled, and only 12.0% of the Internet users had used e-banking before, and 26.8% of the disabled Internet users had used online selling or purchasing.

E. Regarding the ability to receive Internet information, 61.0% of the study subjects knew how to download files from the Internet and install software. Concurrently, 63.4% of them had the ability to search for specific information. However, the study showed that weak ability in English can be a hidden cause of concern for the Internet community. 76.6% of the Internet community believed that they were incapable of reading English web pages.

4. Feedback on the convenience of digitalization

A. Up to 89.9% of the disabled who had accessed the Internet affirmed that computers indeed benefited their lives, only 9.1% thought they did not get any benefits. However, 71.1% of the disabled who had the ability to use computer but have not accessed the Internet claimed that computers were of great benefit to their daily life, 19.1% commenting that computers was not helpful, with 9.8% unable to reply.

B. How did computers or the Internet benefit the disabled 23.2% of the disabled who were part of the computer community claimed that it made information searching much more convenient, making up the highest percentage, followed by acquisition of information instantly (17.5%), and online leisure activities together with killing time came in third place (7.8%). 6.2% felt that computers and the Internet could provide convenience to their lives, while 5.9% and 3.6% respectively thought that it would help with getting knowledge and be a convenient way to keep in touch. The last 3.3% felt that it is helpful to improve efficiency and save time.

IV. Computer Need and Computer Training for the Disabled

(1) Computer need

A. This study revealed that most of the disabled who had the ability to use computer had not used specific purpose built computers, with 97.2% of the computer ownership falling into the general computer category. The reasons for not using the specific purpose built computer by most of the disabled were as

follows: 79.2% of them expressed that there was no necessity, 12.2% were unaware of adaptive computer devices, 1.7% felt that the costs of adaptive computer devices were too high, and the remaining 1.6% said that there were no appropriate adaptive computer devices for them currently.

B. How did the disabled who currently use specific purpose built computers acquire the related information 32.0% of them received the information from various disabled help groups, 16.0% were told by family and friends, 5.1% obtained the information from the Resource Centre for the Blind at Tamkang University. Those who obtained related information from the government and media took up approximately 2.1%, while 14.2% of the disabled could not remember where their source came from.

C. During the process of acquiring adaptive computer devices, what the disabled needed most were computer training (39.3%), followed by subsidies (20.3%) and related information (9.1%).

(2) The need of improvement of computer hardware and software

A. As the study indicates, 24.1% of the disabled who currently used computers felt that the computers were not user-friendly, with 25.8% of them complaining about difficulty in using the operating of software. Among the disabled who had access to the Internet, 14.6% thought that surfing on the Internet was fairly difficult. For the disabled with different education levels, the higher the education level of the disabled, especially with junior high school education level and above, the easier they felt were the software and hardware operation.

B. Regarding the aspects of specific hardware design, the study revealed that 3.7% of the disabled who had the ability to use computer needed voice command or voice input devices, 2.3% required writing recognition keyboards, while 1.5% requested for the enlarged keystroke, and 1.2% felt that voice-recognition technology would be helpful. There were 0.7% and 0.4% of them respectively wishing for enlarged screen fonts and easier operations.

C. Regarding software design,2.0% of the disabled hoped for language localization, with 1.6% wishing that the instructions were more detailed and plain. 1.3% required voice annotation, while 1.2% needed simplified keyboards, and 0.9% asked for simple interfaces and 0.6% needed larger fonts.

D. The difficulties for the disabled who had access to the Internet were as follows: 3.2% complained that it's difficult to find the web pages they needed, 2.1% felt that the input method was inconvenient, 1.7% did not understand English, 1.1% complained that the messages were unclear when there was trouble, 0.8% felt that there were too many words on a web page or the fonts were too small to read, and 0.7% experienced inconvenience caused by the adaptive devices failing to distinguish diagrams.

(3) The need for training

A. 30.2% of the disabled who had the ability to use computer had participated in software or hardware vocational training. Those who needed IT training at present or in the future took up 49.1%, while 50.9% had no requirement for training.

B. As to their training classes needs, 53.5% needed to learn software operations, followed by hardware operations (22.5%). 7.0% of the disabled required computer graphics or multimedia graphic design-related courses. Data processing and web page design took up 4.0% and 3.6% respectively, the programming and application of the Internet shared 1.5%. The needs for learning computer repair and web site creating was between 1.2% and 1.3%.

C. On the channels of acquiring course information, most of the disabled felt that it was most appropriate to get the information through Internet and television, taking up 36.3% and 31.4% respectively. 31.1% of them wished to get the information from newspaper, while 18.9% thought that flyers is better, 14.7% hoping to be informed by the various help groups for the disabled. 7.5% and 4.7% respectively mentioned about magazine and broadcast, 4.1% expected that the institute of vocational education and employment service center would pass on the information.

D. Among the different age groups, those who ranged from 21-40 years of age had a higher percentage had the experience of IT training, as well as a greater desire to participate in computer training in the future when compared to other groups. Among the different education levels of disabled who had access to the Internet, 50.4% of the subjects with technical academic education had participated in computer training, making up the highest percentage over those from other education background.

E. On the aspect of course contents, the hearing mechanism disabled had a greater need for learning hardware operations (40.1%), while vision disabled and limbs disabled had the greater need for software operations (70.8% and 58.0% respectively).

F. Generally speaking, with regards to computer and Internet training, what the disabled needed most were free computer training courses (4.3%), followed by free or subsidized software and hardware costs (3.5%), with the providing of professional courses, vocational training and job opportunities (2.2%) coming in third. 1.7% of them hope to get discount when accessing the Internet, while 1.3% would like to have discounted or subsidized tuition. The need for courses that were specifically designed for different disabilities and usage of specific purpose built computers took up 0.9% and 0.8% respectively. Separately, 6% of them had no specific need for assistance, and 68.9% were unable to answer.

V. Comparison of the Digital Divide Among the Eight Classifications of Disabled

A. The access to information technology for the disabled varies by the classifications of disability. On the areas of access to computer, the suffering facial damage group had the highest computer user rate, followed by the stubborn epilepsy group (38.2%). On the other hand, the hearing mechanism disabled, vision disabled and balancing mechanism disabled had the lowest computer user rate (between 17.1% and 19.0%).

B. As for access to the Internet, the suffering facial damage group had the highest Internet user rate (41.0%), followed by the stubborn epilepsy group and limbs disabled (between 23.6% and 29.1%), while balancing mechanism disabled and hearing mechanism disabled had the lowest Internet user rate (12.0%, 13.4%).

C. There were no significant differences in information literacy among the computer and Internet community for different disabled classifications.

D. Among the eight classifications of disability, the vision disabled had the highest rate of using specific purpose built computer (28.6%). 71.7% of the disabled without computers thought they needed to use the specific purpose built computers, making up the highest percentage of need for adaptive devices.

E. On the aspects of the needs for software and hardware design, the vision disabled were particularly dependent on voice-recognition technology hardware

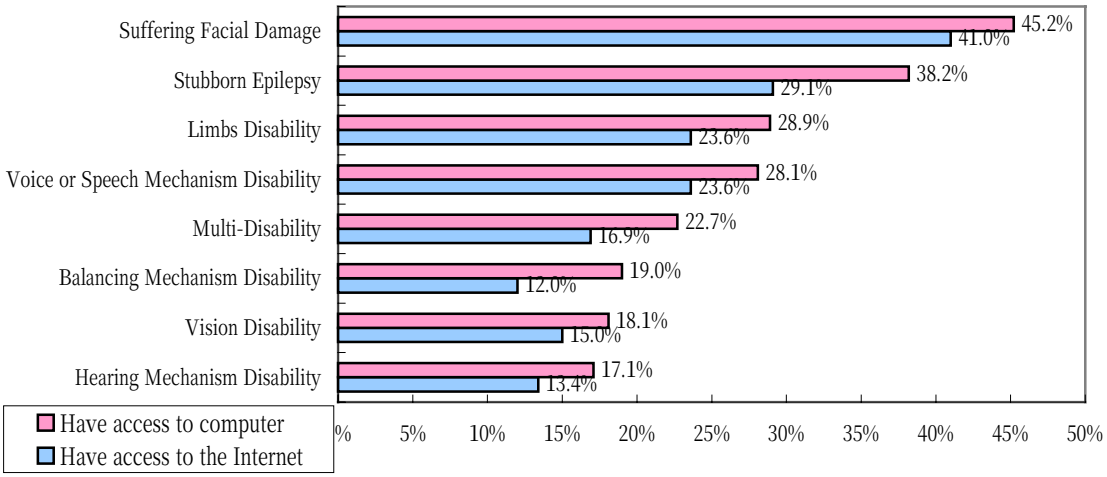
(14.2%), while the limbs and multi-disabled needed voice command or voice input system (3.2%, 6.7%). On the areas of software, the vision disabled wished for voice annotation (8.4%), while the balancing mechanism disabled needed more simplified keystroke (8.5%).

F. As for the computer training courses contents, the hearing mechanism disabled would like to learn hardware operations (40.4%), while the vision and limbs disabled had greater need for software operations (70.8% and 58.0% respectively).

G. Among the disabled who were computer illiterate, the suffering facial damage and limbs disabled did not use computers (69.1% and 65.4% respectively) due to the reason of "not knowing how." Most of the hearing mechanism disabled felt no necessity for it (22.6%), while the majority of vision disabled, balancing mechanism disabled and multi-disability were restricted by their physical conditions, thus being unable to use the computer (about 19%).

H. Among the eight classifications of disabled, the computer illiterate community for hearing mechanism disabled (27.4%) and suffering facial damage (25.1%) had a higher rate of having information agents.

I. By looking at the overall digital performance score among the eight classifications of disabled, the suffering facial damage group had the highest digitalized level (21.7 points), followed by the limbs disabled and voice disabled (about 12 points), while both the hearing mechanism disabled (6.9 points) and balance disabled (6.5%) had the lowest digitalized levels.



VI. The Analysis of Non-User Of Computers & Internet

(1) The reasons of information segregation

A. The study revealed that 74.5% of disabled did not know how to use computers. The reasons for never having used computers before were as followed : 61.9% of them did not know how to use computers, 17.0% felt no necessity, 9.6% were restricted by their physical condition, and 6.0% could not afford the expenses of computing facilities.

B. As for the disabled who knew how to use computers but had no access to the Internet, the top three reasons were: have no knowledge on usage (37.1%), no necessity or no desire (36.7%) and inability to afford the computing expenses (13.3%).

C. Assessing from the aspect of disabled classifications, most of the suffering facial damage and limbs disabled had not used computers because of “Not knowing how” (69.1% and 65.4% for each of the group), while most of the hearing mechanism disabled felt no necessity (22.6%), and the majority of the vision disabled, balance disabled as well as the multi-disability were restricted by their physical condition so that they were unable to use computers (approximate 19% for each of the classification).

(2) The recognition towards the convenience of digital life

A. Most of the disabled who did not have the ability to use computers could not imagine how computers and their application can benefit their lives. Those who were under the impression that having computers at home or having access to the Internet did not provide any assistance to their daily life made up 42.7% and 34.5% respectively. Only 31.8% felt that it would be helpful to have computers at home, and 25.5% considered having access to the Internet being helpful to their daily life.

B. On the contrary, up to 74.9% of the disabled who had the ability to use computer but do not own one, thought that computer facilities were of great benefit to their life, and 69.6% of them affirmed that the Internet benefited their lives also.

C. Disabled males had higher rate than their female counterparts on the acknowledgement of the benefit of computer ownership and Internet accessibility(37.9%:23.5%, 30.8%:18.1%).

(3) The desire to participate in computer training

A. The study revealed that among the disabled who did not know how to use computers, 21.5% of them were willing to learn how to use them, while 78.5% did not have any desire. As for those who had the ability to use computers but did not know how to access the Internet, more than 60% of them (69.3%) were willing to learn.

B. Disabled males (23.2%) had greater learning desire than female (19.0%). More than 40% of those whose age ranged between 12-14 and 21-50 years old, were willing to learn to use computers, making up the highest percentage over other age groups. Among the computer illiterate community with different education level, those who received technical academic education had the greatest learning desire (65.9%), while those whose education level were below elementary school had the lowest computer learning desire, which fell below 10%.

C. The disabled who lived in counties had the greatest motivation to learn (32.9%), followed by cities and provinces (27.0%, 23.7%), those who have lived in township had the lowest desire (between 15.9% and 19.3%).

(4) The recognition of computing facilities

Most of the disabled who did not know how to use computers did not have any idea of which type of the computer was suitable for them. Up to 91.0% who had never used computers did not know that there were specific purpose built computers for the disabled. With regards to personal needs, 62.9% of the disabled did not know what specific purpose built computers were or were unclear about their needs, with 9.6% needed specific purpose built computers and 27.5% expressing that general computers were good enough.

(5) The situation of the family information agent

A. The study revealed that among those who had no ability to access the Internet, approximately one out of every five disabled would have the assistance of the

family members in accessing the Internet for information search, shopping or appointment registration and lodging of appeals (18.6%). 31.0% of the disabled with the ability to use the computer but had not accessed the Internet had information agents at home.

B. Those who were highly educated had a greater rate of having family members acting as their information agents over other groups. Among the computer illiterate community above the university education level, 67.2% of them had family members assisting in online information search, shopping or appointment registration; and more than 40% of those whose education were above the technical academic or graduate school level, had information agents at home (43.3%, 47.5% respectively).

C. Among the different disabled classifications, the computer illiterate community of the hearing mechanism disabled (30.6%), voice disabled (27.4%) and suffering facial damage(25.1%) had the higher rates of having information agents.

VII. The Digital Divide of The Disabled Households

A. 3.9 out of every 10 disabled households had an Internet connection (39.2%); with 56.0% of them using broadband connections while 12.4% used dial-up. 33.9% did not sure of the connecting bandwidth in their home.

B. Further study into the reasons why disabled households did not apply for Internet service revealed the following five main findings: family members did not have the need to access the Internet (40.7%), could not afford the expense of computer facilities (22.6%), could not afford the expense of the connection (6.6%), too busy and not familiar with the operating methods (2.5% for each reason), as well as the environment of communication facilities being not conducive (2.4%).

C. The percentage of Internet connections for disabled households with an income below NT$20,000 per month was only 19.1%, with 70.5% of them without any access to the Internet. The percentage increased dramatically to 53.7% for those with a household income between NT$30,000-NT$40,000 per month. More than 80% of the household having a monthly income above NT$70,000 had Internet connection, with over 70% of it use broadband connection.

VIII. Individual IT Performance Score for the Disabled

A. As a whole, the eight classifications of disabled had a digital score of 10.7 points. Analysis on the structural composition revealed that the scoring by the disabled for access to information technology dimension was the highest (15.4 points), followed by information literacy (10.8 points) and information application (7.4 points).

B. Assessing from the aspects of gender, disabled males (11.9 points) had similar overall digital performance score with disabled females (8.9 points).

C. Among the different age groups, those between 15-30 years of age had the highest digitalized level, with the overall score at 40 points. Whereas those above the age of 51 years old were facing a serious digital divide situation, standing at less than 10 points.

D. The digital abilities for different education level groups had a certain degree of divergence, with the overall digital performance score having direct correlation to education background. The overall digital score was 56.6 points for those who were masters degree holders and above, and approximately 40 points for those who received technical academic and university education, with the uneducated population scoring only 0.2 points..

E. The digital abilities for different industries had a degree of divergence too. Among them, the professionals in the finance, insurance, health and service sectors had the greatest digitalized level, averaging between 64.7 points and 67.2 points, while the information application were weakest for housekeepers (3.2 points), retirees (2.2 points) and mineworkers (1.9 points).

F. Regarding the areas of job profession, the digitalization for professionals stood right at the top (65.9 points), followed by technicians and assistants (45.1 points), as well as administrators (58.7 points). On the other hand, the digitalized situation for those who were non-economically active (6.9 points) and in agricultural industries (2.3 points), the scores were far from ideal.

G. On the aspect of employee groups, the digitalization for those employed in the civil service had achieved 47.4 points of the overall digital performance score, significantly surpassing those of the employers (27.2 points), private enterprise

(24.9 points), self-employed (6.7 points) and unpaid family workers (2.6 points).

H. The average overall digital performance score for the aborigines was 5.9 points, significantly lower than the Hakka population (11.7 points) as well as non-aboriginal and non-Hakka population (10.8 points).

I. The digitalization for suffering facial damage stood right at the top (21.7 points), while hearing mechanism disabled (6.9 points) and balance disabled (6.5 points) had the lowest digitalized level.

J. The information application situation in all townships was approximately in direct proportion with urbanization, where Taipei City, Kaohsiung City, the provinces, and emerging towns had better digital developments (between 13.6 points and 18.2 points), while mountainous regions and offshore islands were the weakest (4.8 point, 2.0 points).

K. The digital developments for those who lived in the mountainous regions (6.6 points) were not as good as aborigines who lived on the ground and non-aboriginal townships (about 11% for each group).

IV. The Disadvantage Digital Situation of the Physically and Mentally Disabled

In order to understand the disadvantage of the digital life of the physically and mentally disabled, this section made a comparison between the study results for the digital divide of the physically and mentally disabled with the 2005 Individual/Household Digital Divide Study. However, there is a need to state that the structure and methods used for these two studies may not be the same, thus the comparison of the results can only be taken as reference purposes.

1. Individual digital divide

(1) Access to information technology

On the area of access to information technology, there was significant divergence between the physically and mentally disabled and the general population.

“Individual/Household Digital Divide Study” revealed that, of those above the age of 12, 66.8% had ever used the computer, while in this study, only 25.5% of the

physically and mentally disabled above the age of 12 knew how to use a computer, not even reaching half that of the general population. As to the Internet usage, the physically and mentally disabled were even more handicapped, with only 20.5% of connectivity rate, far lagging behind the 62.7% achieved by the general population .

(2) Information literacy

In the areas of measuring the four indicators of information literacy, the situation of computer or Internet community of the physically and mentally disabled were not so good as the general population, while the difference was much less.

54% of the physically and mentally disabled computer users could operate a computer independently, whereas for the general population above the age of 12 , the percentage was 51.4%. Furthermore, 39.8% of the physically and mentally disabled had at least the basic ability to maintain computer hardware and software, while 54.5% of the general population could handle basic troubleshooting.

71.5% of the physically and mentally disabled knew how to sent emails, while it was 85.7% for the general population. 31.6% of the physically and mentally disabled knew slightly or were proficient in creating web page, as compared to 37.3% for the general population.

(3) Access to information technology

From the observation on the degree of participation for net citizens, the knowledge of the physically and mentally disabled on government website was low. The rate of using the Internet to access public notices was approximately similar between the general population and the physically and mentally disabled. However, the former had a lower rate of making applications and expressing their opinions on the Internet.

75.8% and 83.3% of physically and mentally disabled as well as general population respectively knew of the government websites. Among them, only 46.5% of both groups had ever used the Internet to access government polices and public notices.

On the areas of making applications or expressing opinions through the government websites, the percentage of physically and mentally disabled users was higher than the general population. Only 28.1% of physically and mentally disabled had ever made applications through government websites, while this percentage was 23.9%

for the general public. Also, 11.6% of the physically and mentally disabled had lodged appeals through government websites with only 7.0% for the general population.

On the areas of daily life applications, the percentage of physically and mentally disabled using the Internet phone was near to that of the Internet community of general population, while the percentage was slightly lower in using the internet for leisure, information search and instant messenger.

The study revealed that 18.9% of the physically and mentally disabled Internet users had used an Internet phone, which was approximately similar to the general population (19.6%). 58.3% of the physically and mentally disabled had used the Internet for leisure activities, while 77.8% of them would use the Internet for information search, and 49.8% had used instant messenger software, where the percentage was slightly lower (respectively 67.4%, 88.1%, 67.6%) than the general population.

On the area of ability to receive information, the physically and mentally disabled were in a poor situation. Among those above the age of 12 in the general population, 74.1% knew how to download and install files from the Internet, while it was only 61.0% for the physically and mentally disabled with such ability. As regards to the search for specific information, 63.4% of the physically and mentally disabled had confidence, which was slightly lower than the general population (79.0%).

Even though the lack of English ability was a common problem among most of the Internet community, but there was still 35.4% of the general population that believed themselves to be able to understand the content of English websites, as compared to 22.5% of the physically and mentally disabled.

2. Household digital divide

“2005 Individual/Household Digital Divide Study” revealed that, for every 10 households, 7 (70.6%) would be able to get on the Internet, while only 39.2 % of the physically and mentally disabled households were able to do so.

From the point of bandwidth of Internet connection, 72.5% of the general households were got online through broadband, while only 56.0% of the physically and mentally disabled households used it.

3. Individual digital score

Comparing individual digital score on the overall digital score area, those above the age of 12 scored 36.3 points, while the physically and mentally disabled scored 10.7 points. Viewing from the point of the three dimensions, most of the general population scored 46.8 points, while the physically and mentally disabled scored 15.4 points. On the areas of information literacy, most of the general population scored 33.5 points, while the physically and mentally disabled scored 10.8 points. Lastly on the dimension of information application, most of the general population scored 31.7 points, while the physically and mentally disabled only scored 7.4 points.

X. Recommendations

The digitalization level for the physically and mentally disabled in comparison to the general public was lagging behind. Besides paying attention to the phenomenon of digital divide caused by socio-economic status or geographic location, the government must direct countermeasures on the much more complicated digital divide problems of the physically and mentally disabled. The policy suggestions are as follow:

A. Inspire the motive for the physically and mentally disabled to participate in an information society

The study discovered that as much as 86.3% of the physically and mentally disabled Internet users affirmed the benefits of computer towards their life. However, for those who did not know how to use a computer, most of them cannot imagine the significance of computers and its benefits for daily life. Those that believed having a computer at home or ability to get on the Internet provided assistance towards life only stood at 31.8% and 25.5% respectively.

Where there is a need, there is a cause for it. For the past general deliberations on bridging the digital divide, most of it was centered on the providing of computer. However the study directed at the physically and mentally disabled discovered that, the insufficient knowledge towards the digital life and lack of motivation and desire for usage are the more fundamental problems. Thus, in order to have more physically and mentally disabled participate in the information society, the prioritized publicizing on the importance of digitalization and its influence on life in the future is necessary.

B. Lifting the opportunities of access to computer for the physically and mentally disabled

The study discovered that there were only 25.5% among the physically and mentally disabled that know how to use a computer, 20.5% had ever used the Internet, which was lagging far behind the general population's 66.8% of computer usage and 62.7% of online rate. As well as that, the 39.2% of connectivity rate for physically and mentally disabled families was far lagging behind the 70.6% for normal families.

The weak financial abilities of the physically and mentally disabled was one of the main reasons for the divide in access to information technology. Among those without personal computer, there were 6.0% expressing inability to afford computer setup costs. While for those families with no Internet connection, 22.6% was due to inability to afford the computer set up costs. From the financial situation of the household, those physically and mentally disabled households with less than NT$20,000 monthly income, the connectivity rate was only 19.1%, and for those whose household income was between NT$30,000- NT$40,000, the connectivity rate was up to 53.7%.

From this, we could see that besides furthering the recognition of the convenience brought by information life for the physically and mentally disabled, it is also important to provide more computers free of charge or at a discounted price too.

C. Strengthen and extensively promote the development of adaptive computer devices

The discussion on information accessibility environment for the physically and mentally disabled are generally divided into two aspects: one is the barrier free environment for end user, while the other is accessibility to web pages (Cheng Ming-chong, Lee Tian-you, Ye Yao-ming, 2003). The former emphasized on the opening up and development of adaptive computer devices such as, computers for the blind, screen enlarging software, sensor mouse, etc; while the latter stresses on the accessible design model of the web page, hoping that the physically and mentally disabled can read the web page contents more easily.

In the past, the government and researchers have placed great emphasis on the development of adaptive computer devices, however despite certain success, this

study had discovered that among the physically and mentally disabled, only 2.8% used the specific built computer. Aside from the 79.2% who did not need adaptive computer devices, 12.2% did not know there were adaptive computer devices, while 1.7% reckoned that adaptive computer devices was too expensive. 1.6% felt that there are no suitable adaptive computer devices, especially for the highly in need vision disabled. Finally 23.8% did not know there were adaptive computer devices and 4.5% expressed that there were no applicable adaptive computer devices.

Countering the above situation, the integration level for the related need of adaptive computer devices and its development needs have to be surveyed anew, besides choosing a suitable channel to strengthened the publicizing in letting the physically and mentally disabled know the availability of these choices and that suitable assistance measures are in place.

D. Realizing the accessibility of Internet

To ensure the information equality rights of the physically and mentally disabled, the government in its furtherance of the e-government has also included the realization of the web accessibility as a key point. Although this study did not specially probe deeper into the opinions of the physically and mentally disabled on the barrier-free web pages, there were still 14.6% of the physically and mentally disabled internet community who felt that browsing the internet was still difficult (among them, 3.2% interviewees mentioned of the difficulties in web page searching through their own accord, 1.1% met with situations and were unable to read or assess, 0.8% felt that the fonts were too small and 0.7% pointed out the adaptive computer devices were unable to distinguish the diagrams etc problems), showing that there was still lots of room for improvement in the advancing the accessibility of Internet.

E. Establishing training classes that meet the requirement

The study discovered that 30.2% of the physically and mentally disabled who knew how to use a computer had ever participated in job related software and hardware training, with 49.1 % of them expressed that they had the need for educational computer training at present and in the future. In the area that required the assistance of the government, there was a higher percentage of physically and mentally disabled wishing to acquire professional software and hardware operating skills, as well as received assistance for employment (2.2%), taking up third place in the ranking of various needs.

As for the contents of the training classes, the percentage of those wishing to learn the operation of software was the most (53.5%), followed by hardware operation (22.5%), computer graphics or multimedia design related (7.0%), and finally data management and web page design took up 4.0% and 3.6% respectively.

In addition, 0.9% of the physically and mentally disabled who wished to have lessons that cater for specific handicap needs. Even though the percentage was not high, further consideration would be worthwhile. Were the contents of the training classes currently suitable for the physically and mentally disabled? For example, this study discovered that in many areas of digital development, those with hearing mechanism disability were in a more disadvantaged position. To assist in raising their information ability on the area of teachers, it can be considered to provide sign language lecturers (or sign language translators) to lower the barrier for their learning, since those with hearing mechanism disability are used to the sign language.

F. Promoting “information agents”

This study discovered that currently among the physically and mentally disabled, approximately among them, every one in five had ever had the assistance of a family member in searching the Internet for daily life application, online purchasing or appointment registration, as well as lodging appeals. For those physically and mentally disabled who knew how to used a computer but had yet to use the Internet, they seem to be able to understand the usefulness of the information agent, with 31% asking family members to go online and handle matters.

Even though providing a suitable software and hardware environment would reduce the gap in the use of information technology for the physically and mentally disabled, however, due to the restrictive physical conditions, the only hope of increasing the number of physically and mentally disabled computer users to let them enjoy the convenience of digital life, is through valuing and promoting the concept of the “Information Agent”.