IPA Computer Virus Survey 2000

Security Center
Information-technology Promotion Agency
JAPAN

February, 2001

FOREWORD

This survey report summarizes the survey result of "Computer Virus Infection Report in Overseas" conducted by Information-technology Promotion Agency of JAPAN over a period of last year. This survey of year 2000 particularly focused on Asian markets especially Korea, Taiwan, Singapore and Hong Kong, as well as the United States, totaling five countries/regions.

As a result each country reported very high percentage of virus infection. Computer virus infection rapidly expanded along with frequent and daily use of e-mail transmission based on intra- and inter-company network infrastructure. This trend is expected to continue, as e-commerce transaction will further expand in the coming future.

It is our hope that the facts of infection reported in this overseas survey and direction of anti-virus and restoration measurements shall be able to contribute to development of prevention methods of computer virus in Japan as well as overall preventive action in the future. In addition, we duly appreciate help and support of many participants in foreign countries who answered to the questionnaires, and Mitsubishi Research Institute, Inc. which compiled data and documents of survey results.

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1. Outline of the survey

1.1 Objective of the survey

The survey was conducted for the objective of collection and analysis of data and information related to computer virus infection and damages in the U.S. and two other regions in Asia in order to contribute to development of effective anti-virus technology.

1.2 Survey definitions

(1) Countries surveyed:

The areas where this survey covered were United States of America, Korea, Taiwan, Singapore, and Hong Kong totaling five countries/regions.

(2) Respondents

Survey respondents were chosen among population consist of “information system managers” at business organizations, universities, research institutions, and software companies.

The survey with the respondents was performed by research companies at each country, which selected the respondents according to company/industry database and member lists of relevant organizations.

1.3 Survey method

Survey was made by collection of questionnaire sheets by mail as well as questions and answers by telephone directly to the respondents.

Questionnaire sheets were translated into English for the U.S. and Singapore, Hangul for Korea, and Chinese for Taiwan and Hong Kong.

1.4 Term of the survey

Survey sheets were distributed after the middle of November 2000, and collected by the end of December 2000.

1.5 List of questionnaire

The survey was conducted using the following list of questionnaire. The survey questionnaire was for the period from December 1999 through November 2000.

I Summary of respondents

(1) Types of companies/organizations

(2) Number of employees

(3) Number and types of computers in use

(4) Current of in-house information network system

(5) Connection to Internet

1) Connection to Internet

2) Use of Internet

(6) Use of Macro function

1) Macro at MS-Word

2) Macro at MS-Excel

II Damage from computer viruses

(1) Concern with computer virus

1) Awareness of computer virus

2) Threat from computer virus

(2) Installation of anti-virus software

(3) System for anti-virus measurement

1) In-house system

2) System to update anti-virus software

3) Information sources of anti-virus software

4) Criteria when selecting anti-virus software

(5) Damage caused by computer virus

1) Virus infection during the survey period

2) Number of types of viruses causing the infection

3) Names of viruses causing the infection

4) Total number of computers infected

5) Total number of devices infected

(6) Analysis of virus-originated damage

1) Damage by types and number of machines infected

2) Method of virus detection

3) Anti-virus software used to detect virus

4) Route of virus infection

5) Restoration method

6) Extent of damage

(7) User education concerning computer viruse

(8) Computer virus-related information required

1.6 Response to the questionnaires

Number of valid answers totaled 2,966 which shared 11.9% out of all questionnaires sent.

Following is the by-country-region summary of answers and its ratio.
Each country made more than 500 answers and that seemed sufficient to conclude the summary of each country.

Table 1.6 Summary of answers

Item / Country/area	Number mailed	Number returned	Return ratio
USA	5,000	865	17.3%
Korea	5,000	500	10.0
Taiwan	5,000	510	10.2
Singapore	5,000	590	11.8
Hong Kong	5,000	501	10.0
Total	25,000	2,966	11.9

1.7 Others

The organization which conducted the survey was Security Center, Information-technology Promotion Agency of Japan.

Actual contacts with overseas research institutions and preparatory works were managed by Mitsubishi Research Institute, Inc.

2. Characteristics of the respondent companies/organizations

The survey was accomplished with questionnaires mailed to respondents who were sampled out of population consist of “information system managers” at business organizations, universities, research institutions, and software companies. The same sampling method were applied to these five country/regions, but attribute of respondents varied according to the country/region.

Following is the distribution of respondents by category of industry and number of employees.

2.1 Types of companies/organizations

Majority of industry distribution represented manufacturing and services, while there are some variation in addition. Service industry held the largest share, followed by manufacturing, in Taiwan, Singapore and Hong Kong, that reflected industry structure of respective country/region. In Korea, manufacturing was the top and then service industry. In the U.S., academic institution and local governments had largest respondent group, which implied that obtaining information from private sector companies had some difficulty due to internal information control, while public institutions had made sufficient progress on overall disclosure of information.

Table 2.1.1 Responding companies/organizations by type

Category \ Country	USA		Korea		Taiwan		Singapore		Hong Kong	
	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)
Agriculture, Forestry, Fishery	3	0.3%	7	1.4	1	0.2	1	0.2	0	0.0
Mining, Construction	8	0.9	19	3.8	10	2.0	72	12.2	17	3.4
Manufacturing	249	28.8	190	37.8	77	15.1	143	24.2	148	29.6
Other Services	141	16.3	110	21.9	311	61.0	276	46.8	244	48.8
Information Service	44	5.1	59	11.7	63	12.4	13	2.2	13	2.6
Education, Research, Governments	399	46.2	20	4.0	39	7.6	3	0.5	13	2.6
Others	20	2.3	98	19.5	9	1.8	82	13.9	65	13.0
Total	864	100.0	503	100.0	510	100.0	590	100.0	500	100.0

Not indicated	2	5	0	0	1

※ There were duplicate answers on industry and its total numbers are not equal to the total return numbers.

Others: trade, distribution, oil, airline, travel, e-publishing, design, architecture, consulting, advertisement, cleaning, churches, etc.

2.2 Number of employees

The organization size of respondents showed majority was a medium-sized company with less than 50 employees in all countries/regions, which held more than 80% in Hong Kong, 70% in the U.S., more than 60% in Singapore and more than 50% in Korea. The second largest group was those with 100-299 employees, then 50-99 employees in the four countries/regions other than the U.S., which had organization with more than 1000 employees in the second group that occupied 17.5% share.

General distribution of respondents was fairly diversified at all country/region, having smaller organization with less than 50 employees to very large organization with more than 1000 people.

Below it's the table of summary of responding organization by number of employees.

Table 2.2.1 Responding organization by number of employees

Country / Number of Employees	USA		Korea		Taiwan		Singapore		Hong Kong	
	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)
Less than 50	606	70.1%	252	52.4	228	44.8	373	63.2	429	85.6
50 to 99	55	6.4	63	13.1	42	8.3	66	11.2	20	4.0
100 to299	31	3.6	84	17.5	108	21.2	104	17.6	33	6.6
300 to 499	8	0.9	22	4.6	38	7.5	17	2.9	8	1.6
500 to 999	13	1.5	20	4.2	43	8.4	15	2.5	6	1.2
More than 1,000	151	17.5	40	8.3	50	9.8	15	2.5	5	1.0
Total	864	100.0	481	100.0	509	100.0	590	100.0	501	100.0
Unknown	1		19		1		0		0	

2.3 Number and types of computers in use

Result of number and types of computers in use showed that DOS/Windows for 1-10 units held more than 60% in the U.S. and Hong Kong. In other countries/region its use at 1-10 units and 11-50 units occupies more than 60% of total respondents, which means that the number of use of DOS/Windows at each organization was not exceedingly high. This, however, reflected the fact that average size of the respondents was fairly small as seen in 2.2. In Hong Kong, more than 60% of answers showed its use of 1-10 units and this is the smallest use in a region. On the other hand, the U.S. showed more use of Macintosh than other countries/regions, while other four countries/regions had very limited use of Macintosh and the small use such as 1-10 units accounted for more than 80%.

Figure 2.3.1 Computers being used: DOS/Windows

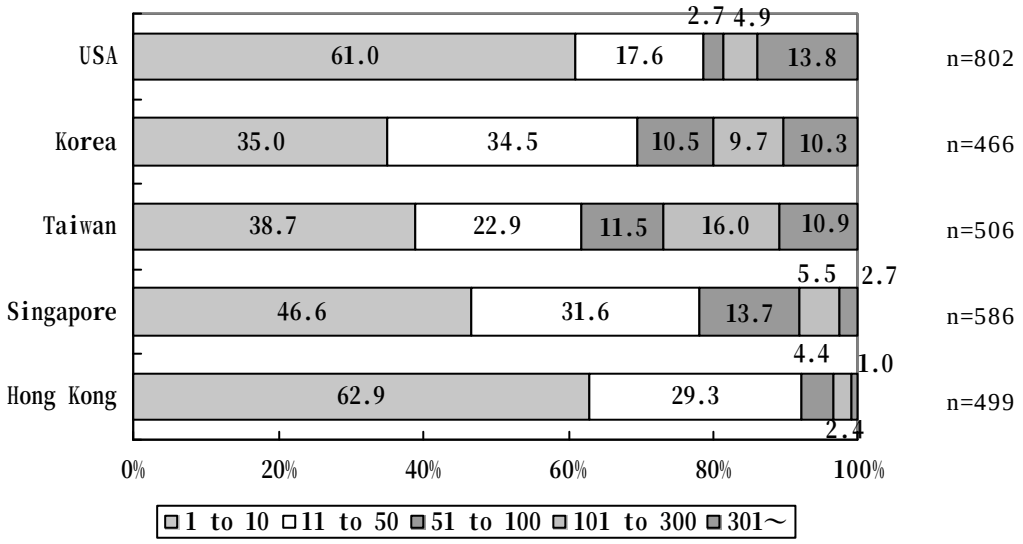


Figure 2.3.2 Computers being used: Macintosh

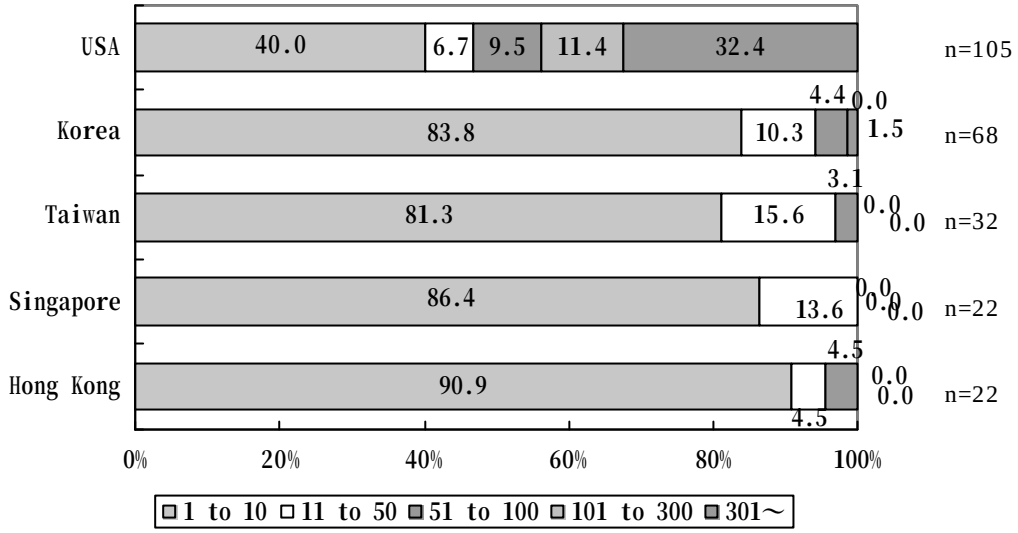
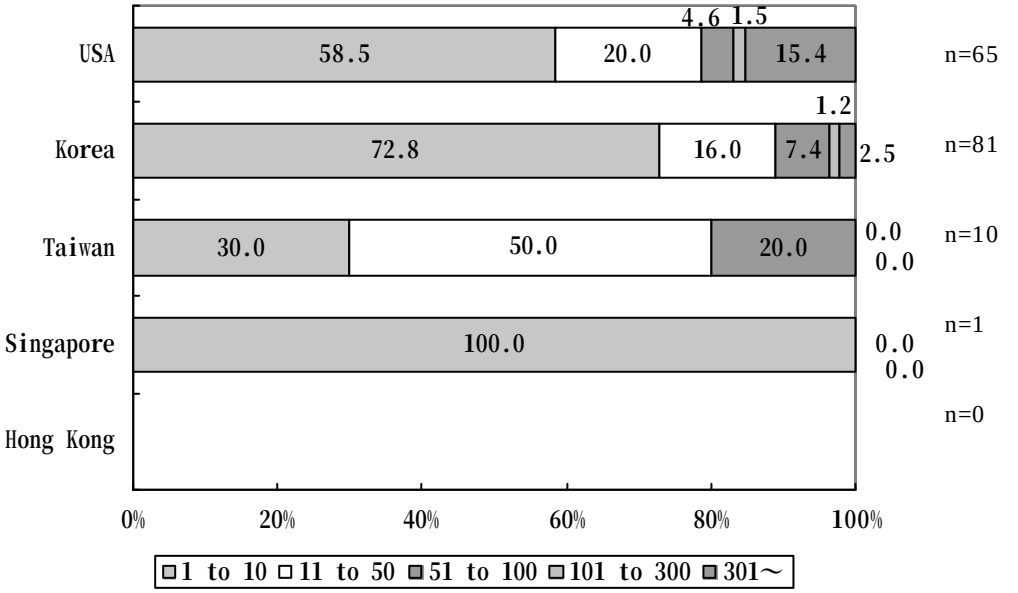


Figure 2.3.3 Computers being used: Others



2.4 Current of in-house information network

More than 50% of respondents had developed In-house information network ("Intra-Net") in four countries/regions other than Taiwan. In Taiwan, approx. 30% of respondents had developed inter-office network in addition to intra-office network which was close to 50%.

On the other hand, approx. 40% respondents in Hong Kong and close to 30% in Singapore had no intra-office network.

Table 2.4.1 Current of in-house information network

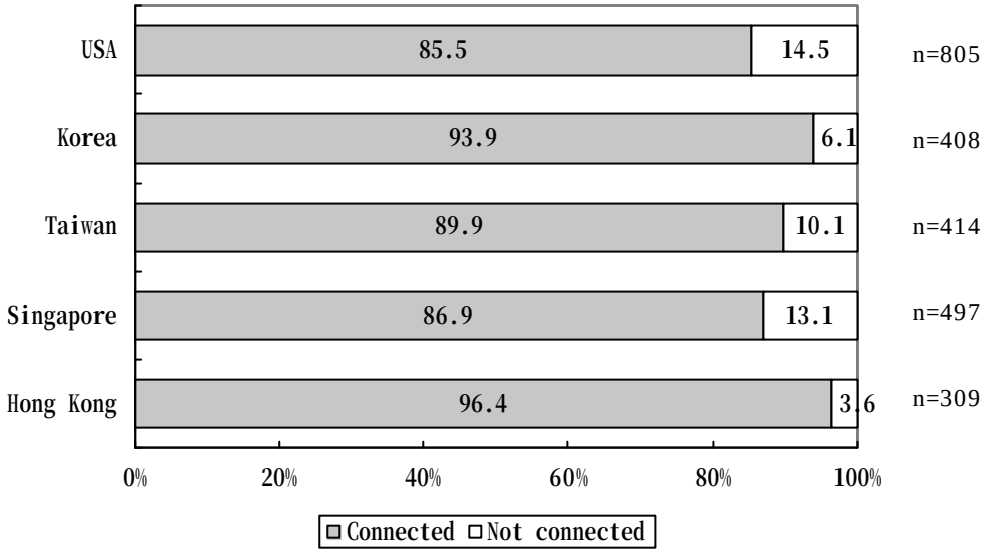
Country / Network	USA		Korea		Taiwan		Singapore		Hong Kong	
	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)
Intra-office network(WAN) only	437	50.4%	313	65.9	246	48.3	321	53.9	275	55.0
Inter-office network(WAN) as well as LAN	212	24.5	100	21.1	163	32.0	115	19.3	30	6.0
No in-house information network	218	25.1	62	13.1	100	19.6	159	26.7	195	39.0
Total	867	100.0	475	100.0	509	100.0	595	100.0	500	100.0

2.5 Connection to Internet

2.5.1 Connection to Internet

More than or close to 90% of the respondents in all five countries/regions having developed intra-net and inter-office network reported that they connect to Internet.

Figure 2.5.1 Connection to Internet



2.5.2 Use of Internet

"E-mail" was the largest percentage of activity of using Internet, which represented 98.3% in the U.S. and even 77.5% in Taiwan (the lowest of all) with average of more than 90% in the five countries/regions surveyed. Second largest user group favored "browsing home pages", followed by "down-loading and up-loading of files".

By country/region characteristics show that the U.S showed more numbers participated in each of the group. It was observed that Singapore and Hong Kong had more number of respondents using "email" but fewer in "opening own home page" and "browsing home pages" compared to other countries/regions.

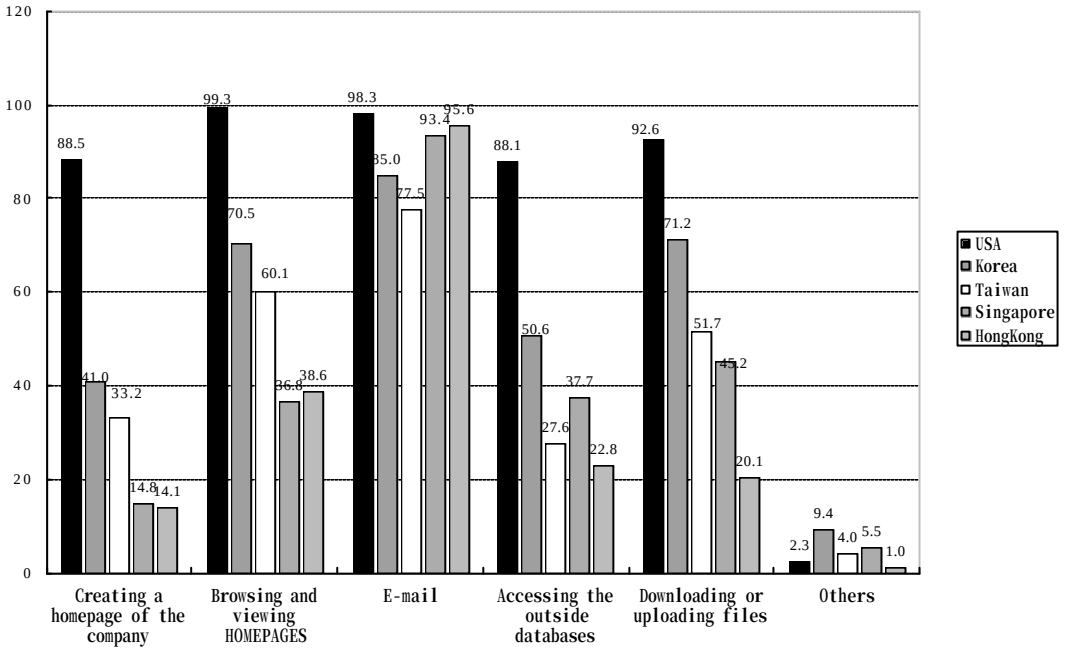


Figure 2.5.2 Use of Internet

Note: Includes multiple responses.(USA：n=687、Korea：n=427、Taiwan：n=373、Singapore：n=438、Hong Kong：n=298)

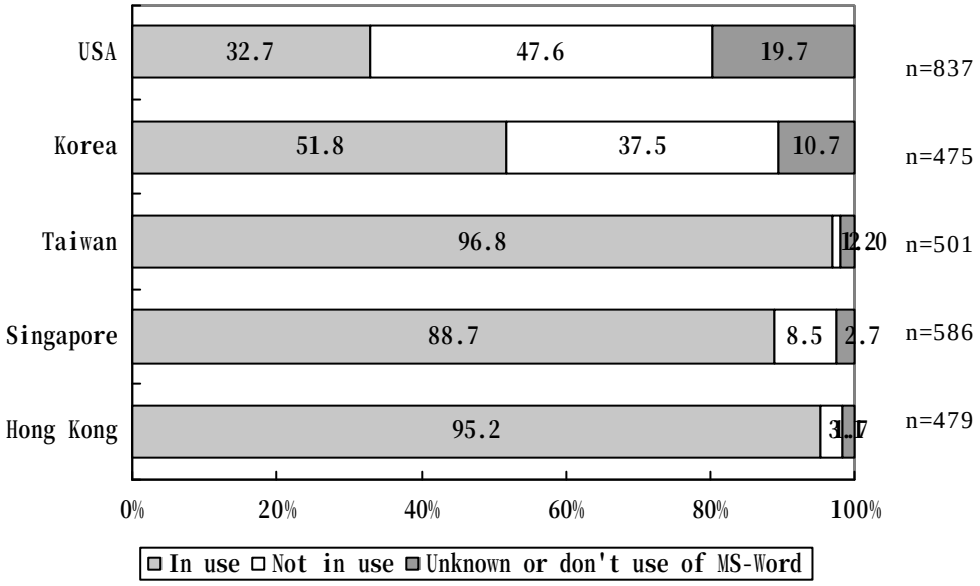
Others : e-commerce, B to B, Internet-banking, e-publishing, information reference, education, Intranet, group-ware, mailing service, etc.

2.6 Use of Macro function

2.6.1 Macro at MS-Word

Survey respondents in Taiwan, Singapore and Hong Kong region reported that more than 90% of them used MACRO at MS-Word while a half of respondents in Korea and a little more than 30% in the U.S. used the function. In the U.S., approx. 50% of respondents reported no use of Macro which characterized the U.S. market.

Figure 2.6.1 Use of Macro at MS-Word

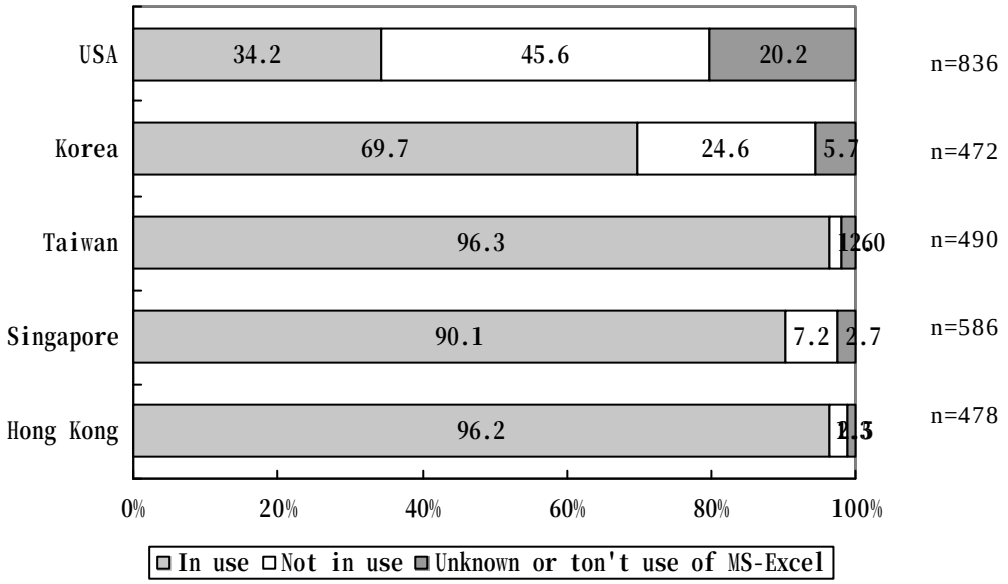


2.6.2 Macro at MS-Excel

Survey respondents in Taiwan, Singapore and Hong Kong region reported that more than 90% of them used MACRO at MS-Excel while about 70% of respondents in Korea and a little more than 30% in the U.S. used the function. In the U.S., approx. 50% of respondents reported no use of Macro which characterized the U.S. market.

This is very similar to the use of Macro at MS-Word as seen at 2.6.1

Figure 2.6.2 Use of Macro at MS-Excel



3. Damage from computer viruses

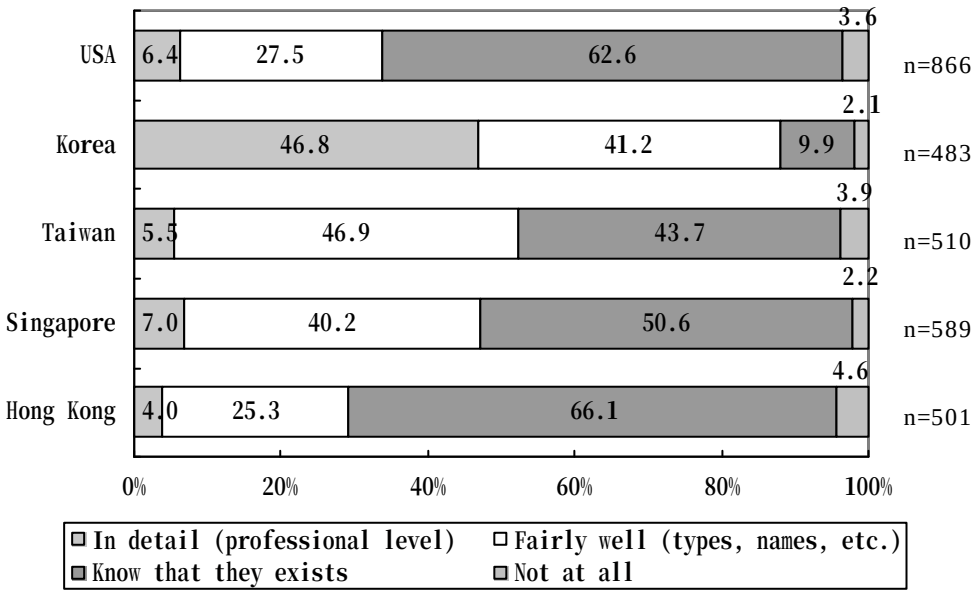
3.1 Concern with computer viruses

3.1.1 Awareness of computer viruses

Respondents answered "know in detail" of computer viruses accounted for 46.8% in Korea, which is the highest percentage among other country/regions. The percentage was lower than last year's 61.5%, but it showed that Korea continued to have highest perception pattern of computer virus compared to others.

In other countries/regions, those who answered "know in detail" shared only 7.0% in Singapore (10.3% last year), 6.4% in the U.S. 5.5% in Taiwan, and 4.0% in Hong Kong. Total answers including "know in detail" and "know approximately" accounted for about 50% in Taiwan and Singapore, 30% in Hong Kong and the U.S., which lead to conclude that overall level of perception to computer viruses remains low.

Figure 3.1.1 Awareness of computer viruses

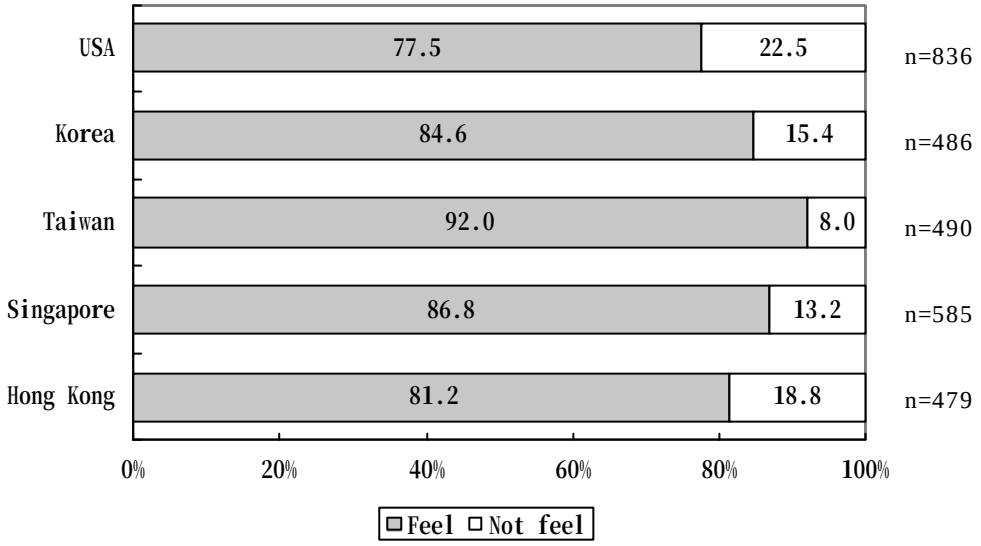


3.1.2 Threat from computer viruses

Respondents who answered to "feel threat" totaled more than 80% in all countries/ regions, with Taiwan especially higher.

The threat to computer viruses seems to increase from last year where the survey result showed that "feel threat" shared 55.7% in the U.S., 81.3% in Korea, 64.7% in Singapore respectively.

Figure 3.1.2 Threat from computer viruses

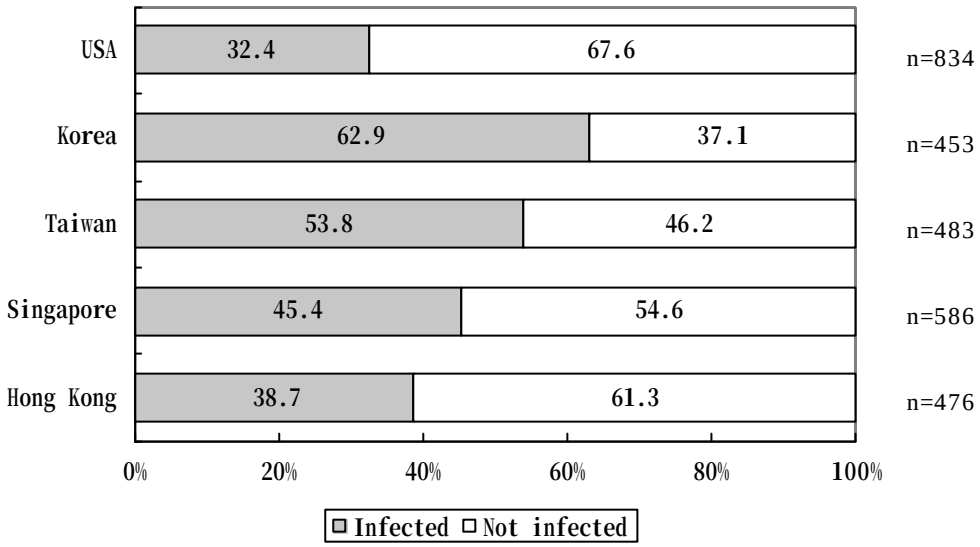


3.2 Damage caused by computer viruses

3.2.1 Virus infection during the survey period

Damage report during the survey period was fairly diversified by the country/region, having 62.9% in Korea, 53.8% in Taiwan versus merely 32.4% in the U.S.

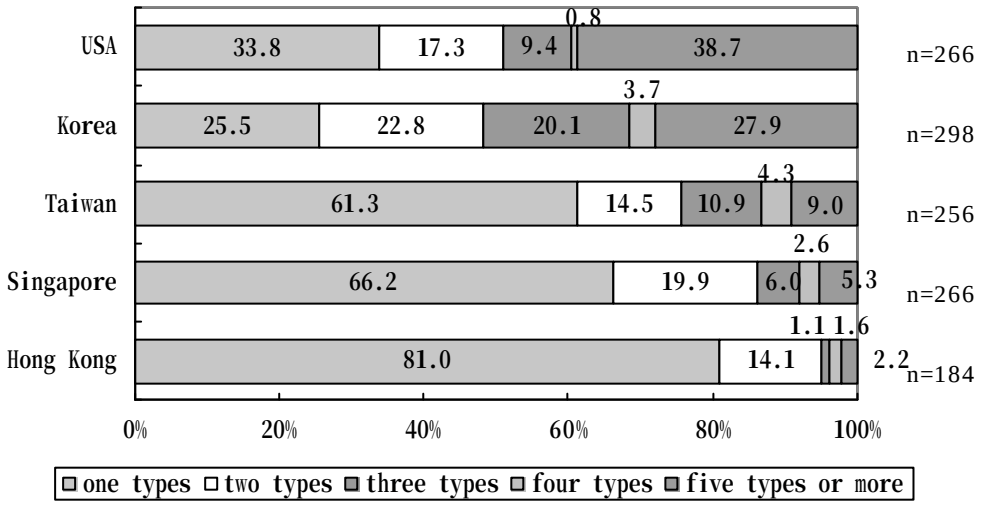
Figure 3.2.1 Virus infection during the survey period



3.2.2 Number of types of computer viruses causing the infection

Report of number of types of computer viruses showed that there are many cases of multiple infections especially in the U.S. and Korea. In the U.S. about 40% reported to have infected with more than five viruses, facing risk exposures of many types of virus infections. On the other hand, more than 60% of respondents Hong Kong, Singapore and Taiwan reported only one type of virus infection, and there are not too many types of virus in these counties/regions.

Figure 3.2.2 Number of types of computer viruses causing the infection



3.2.3 Names of viruses causing the infection

The result of Survey 2000 showed much different pattern of virus infection from Survey 1999. In other words, VBS/LOVELETTER(I LOVE YOU) virus which caused big problems in the world in 2000 was ranked No.1 virus in the U.S., Singapore and Hong Kong, and No.2 in Korea and Taiwan. (22.3% in Singapore, 20.9% in the U.S., 15.1% in Taiwan, 14.4% in Korea and 10.2% in Hong Kong)

W32/CIH virus, which debut in Korea and Taiwan in Survey 1998 with big influence, and had highest infection rate of average 17.5% in all five countries/region in Survey 1999, still remained violent in Korea in this year's survey with 15.8% infection rate, higher than VBS/LOVELETTER (I LOVE YOU).

Respondents reported that W32/Navidad infection was highest with 17.0% rate in Taiwan. This virus spread rather late during the survey period, showing that this virus was reported in "others" group, and representing very rapid infection in Taiwan.

In addition, especially W97M/Melissa was violent in the U.S., so was Wscript/Kak Worm and W97M/Melissa in Hong Kong. The following viruses were reported active though they were not specifically nominated in the questionnaire ;

- W32/Navidad

as well as

- W32/MTX
- W32/Funlove (influential especially in Korea)

Table 3.2.3 Names of viruses causing the infection

Name \ Country	USA		Korea		Taiwan		Singapore		Hong Kong	
	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)
VBS/Freelinks	2	0.4%	4	0.6	0	0.0	2	0.5	1	0.5
VBS/LOVELETTER (I LOVE YOU)	99	20.9	101	14.4	61	15.1	87	22.3	21	10.2
VBS/Stages (Life_Stages Worm)	4	0.8	12	1.7	1	0.2	17	4.3	0	0.0
W97M/Class	5	1.1	7	1.0	4	1.0	2	0.5	1	0.5
W97M/Ethan	17	3.6	10	1.4	0	0.0	0	0.0	0	0.0
W97M/Marker	13	2.7	7	1.0	0	0.0	3	0.8	1	0.5
W97M/Melissa	35	7.4	43	6.1	17	4.2	35	9.0	2	1.0
W97M/Myna (W97M/MNIV)	6	1.3	0	0.0	1	0.2	2	0.5	0	0.0
W97M/Pri (W97M/PSD)	5	1.1	1	0.1	2	0.5	0	0.0	0	0.0
W97M/Story (W97M/Jack-in-the-box)	5	1.1	2	0.3	3	0.7	1	0.3	0	0.0
W97M/Thus	4	0.8	2	0.3	2	0.5	1	0.3	0	0.0
W97M/X97M/P97M/Tristate (097M/Tristate)	5	1.1	11	1.6	2	0.5	8	2.0	0	0.0
Win32/CIH(CHERNOBYL, SPACEFILLER)	6	1.3	111	15.8	21	5.2	12	3.1	9	4.4
Win32/Fix2001	1	0.2	7	1.0	0	0.0	2	0.5	0	0.0
Win32/NewApt	0	0.0	4	0.6	0	0.0	0	0.0	0	0.0
Win32/PrettyPark	13	2.7	22	3.1	16	4.0	18	4.6	3	1.5
Win32/Ska (Happy99)	20	4.2	30	4.3	14	3.5	21	5.4	16	7.8
WM/Cap	0	0.0	4	0.6	0	0.0	4	1.0	0	0.0
Wscript/KakWorm	26	5.5	11	1.6	0	0.0	57	14.6	2	1.0
XM/X97M/Laroux	2	0.4	85	12.1	0	0.0	2	0.5	0	0.0
W32/Navidad	12	2.5	41	5.8	69	17.0	8	2.0	1	0.5
W32/Funlove	2	0.4	33	4.7	1	0.2	0	0.0	0	0.0
W32/MTX	6	1.3	9	1.3	8	2.0	13	3.3	14	6.8
Others	56	11.8	77	11.0	92	22.7	31	7.9	17	8.3
Unidentified	130	27.4	67	9.6	91	22.5	65	16.6	118	57.3
Total	474	100.0	701	100.0	405	100.0	391	100.0	206	100.0

Note: Includes multiple responses.

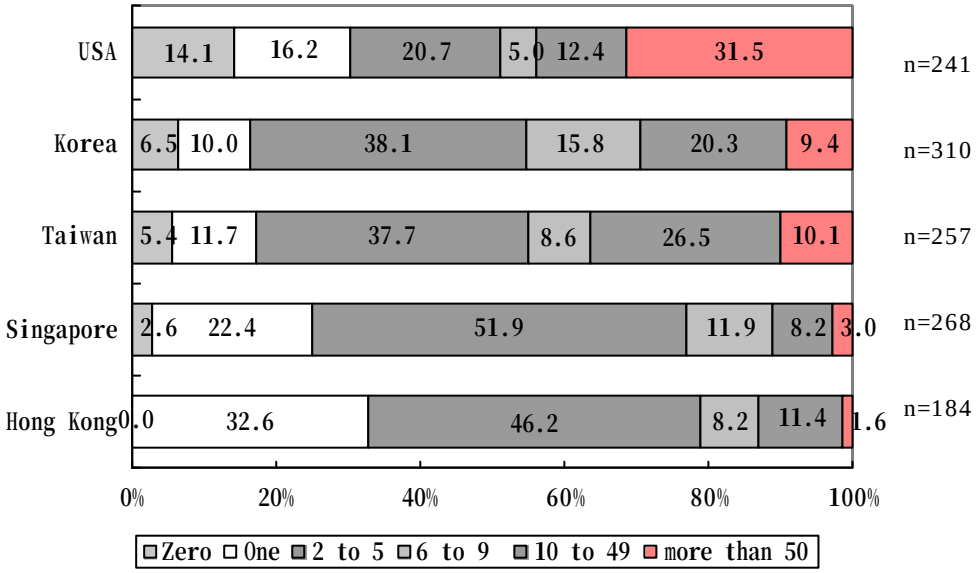
（USA：n=265、Korea：**n**=294、Taiwan：**n**=257、Singapore：**n**=266、Hong Kong：**n**=184）

Others: W32/QAZ, W32/Kriz, W32/Msinit, W32/Prolin, X'mas, X97M/Barisada, X97M/Divi, X97M/Sugar etc.

3.2.4 Total number of computers infected

Number of computers infected was most commonly reported to have "2-5 units" in the countries/region other than the U.S., where "more than 50 units" were reportedly infected with largest share and followed by "2-5 units" as the second. The reason why the number of computers infected in the U.S. was larger was that the size of organization tended to be larger in the U.S.

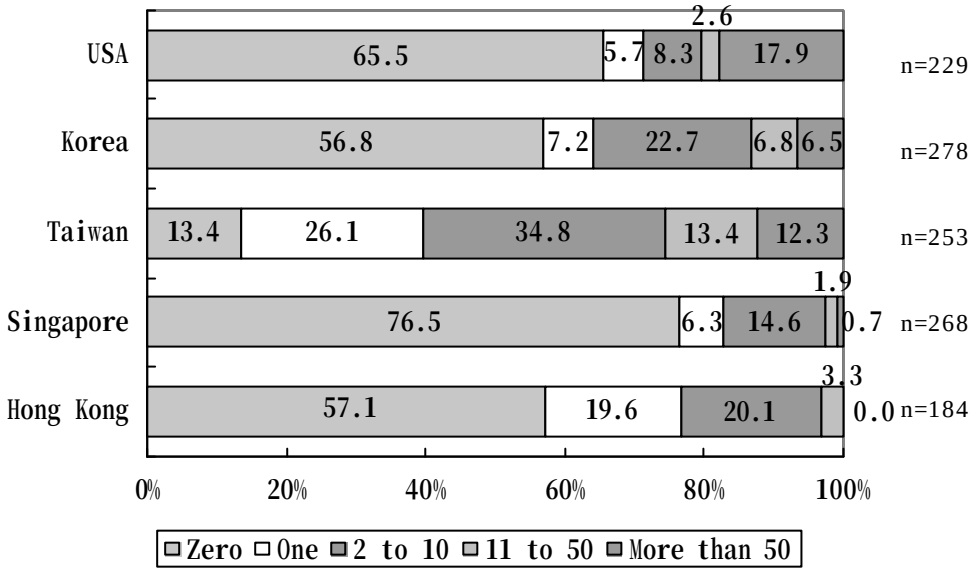
Figure 3.2.4 Total number of computers infected



3.2.5 Total number of device infected

In view of numbers of device infected such as floppy disks, four countries/regions reported more than 50% was “zero” except for Taiwan, where “2-4” accounted for 34.8%, the largest group, and “zero” remained at only 13.4.

Figure 3.2.5 Total number of device infected



4. Current measures used to cope with computer viruses

4.1 Installation of anti-virus software

It was found that installation of anti-virus software by category of computer by use showed following patterns.

Looking at “client machines”, installation of anti-virus software was generally high with reported share of 84.1% in the U.S., 70-75% in Taiwan, Singapore and Korea, and 60.4% in Korea, all of which reported “they installed the software for more than 90% of computers”. In this survey, Korea was least advanced in terms of software installation.

As for “gateway machine”, installation share was high in the U.S., Singapore and Hong Kong, while no installation of software was found at more than half of respondents in Korea and Taiwan.

“Groupware” showed the same tendency as “gateway machines”.

For “server machines”, the U.S., Singapore and Hong Kong showed many cases that have installed anti-virus software, but Korea and Taiwan had many cases that no software was installed.

From the above, the U.S., Singapore and Hong Kong reported to have mostly installed anti-virus software in any category of computers, but Korea and Taiwan showed much less report of installation except for “client machine” computers.

Figure 4.1.1 Installation of anti-virus software : Client Machine

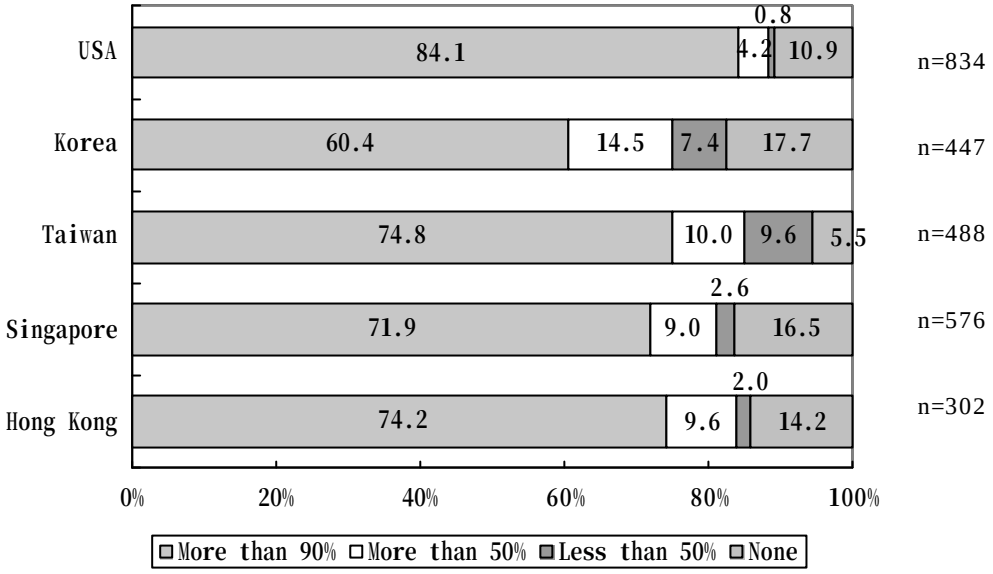


Figure 4.1.2 Installation of anti-virus software : Gateway Machine

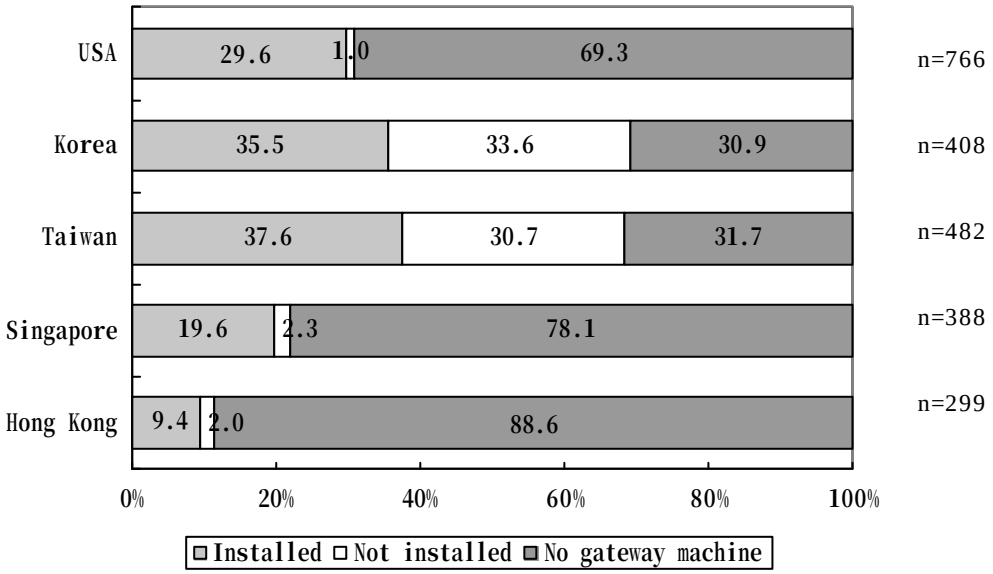


Figure 4.1.3 Installation of anti-virus software : Groupware Machine

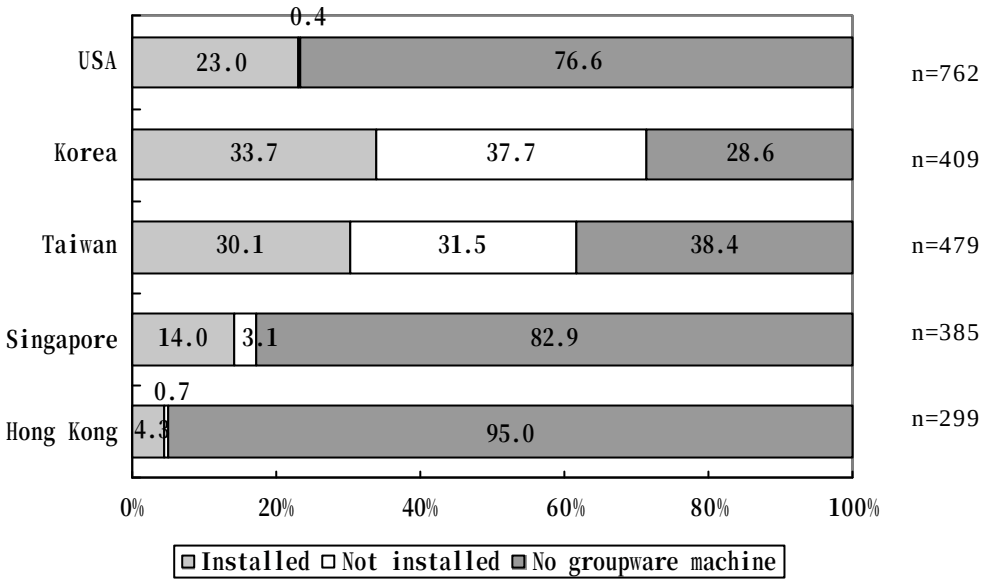
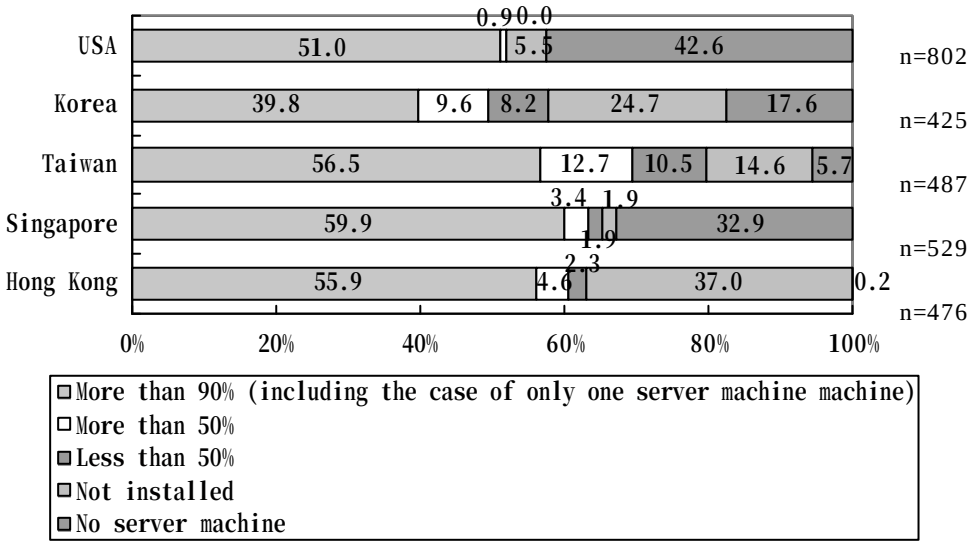


Figure 4.1.4 Installation of anti-virus software : Server Machine

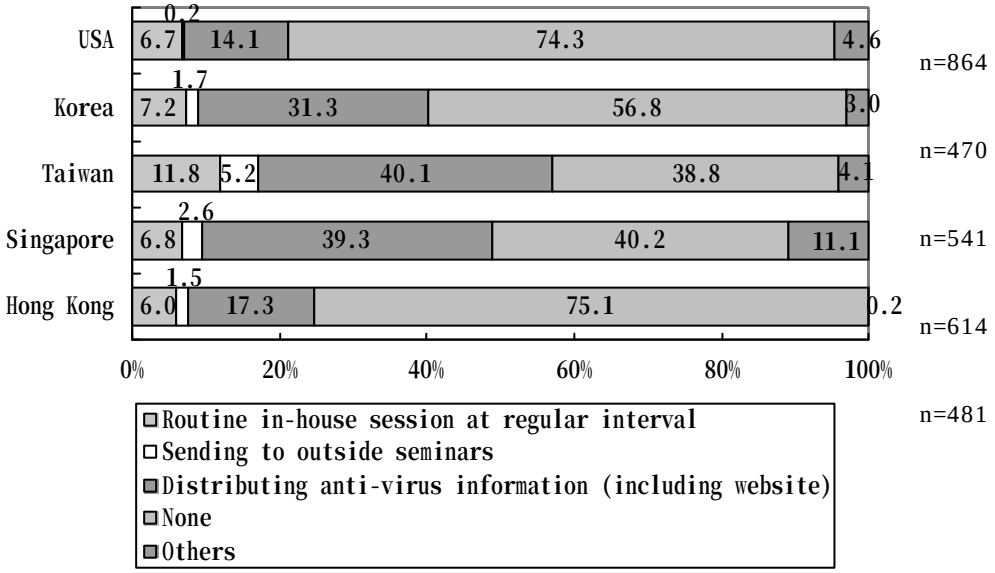


4.2 User education concerning computer viruses

In the survey 1999 (for the countries of the U.S., U.K., Germany, Singapore and Korea) all the countries reported that more than 50% of respondents had “education” for anti-virus measures, but the survey 2000 reported that “no user education is made” accounted for 75.1% in Hong Kong, 74.3% in the U.S., and 56.3% in Korea.

User education mostly included “distribution of anti-virus information”, and “in-house sessions”

Figure 4.2.1 Contents of user education



(Note: Includes multiple responses.)

Others : General instructions by informal, verbal instruction, in-house briefing, email updating information, email with precautions, setting up security policy, newsletter from anti-virus software company, contract with anti-virus specialists, instruction not to install personal software and applications into organization, individual protection measures and intelligence, etc.

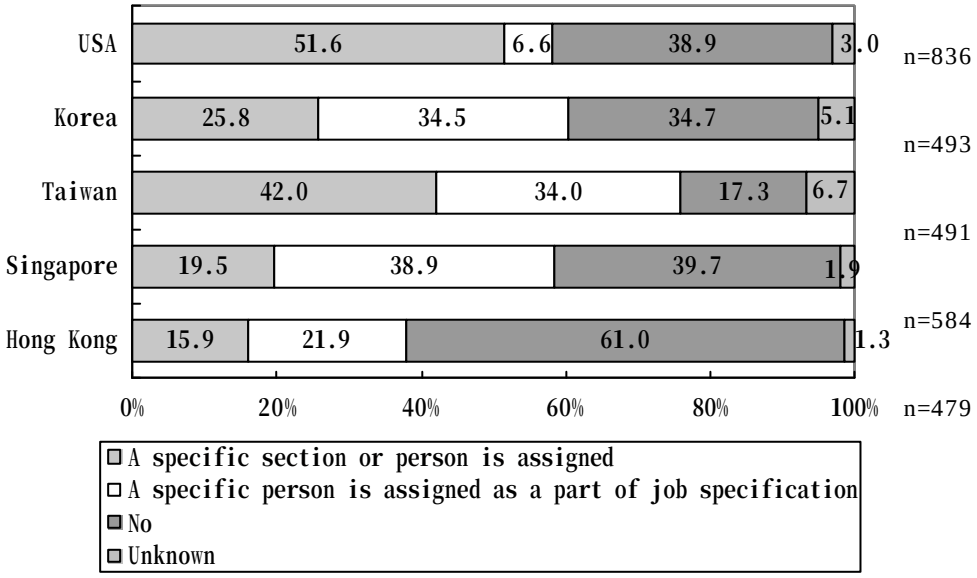
4.3 System for anti-virus measurements

4.3.1 In-house system for anti-virus measurement

In view of systematic approach to control anti-virus measurements, the U.S. reported that more than half of respondents had “specific section in charge” for anti-virus measurements while in Singapore and Hong Kong less than 20% of respondents reported to have such special section.

In addition to specific section in charge, there is a report of “assigned person (concurrent responsibility)” which accounted for more than 50% of respondents in four countries/region other than Hong Kong. This means the four countries/regions generally had some system of anti-virus measurement, but about 60% of Hong Kong respondents answered that there existed no such section or person or no systematic approach.

Figure 4.3.1 In-house system for anti-virus measurements

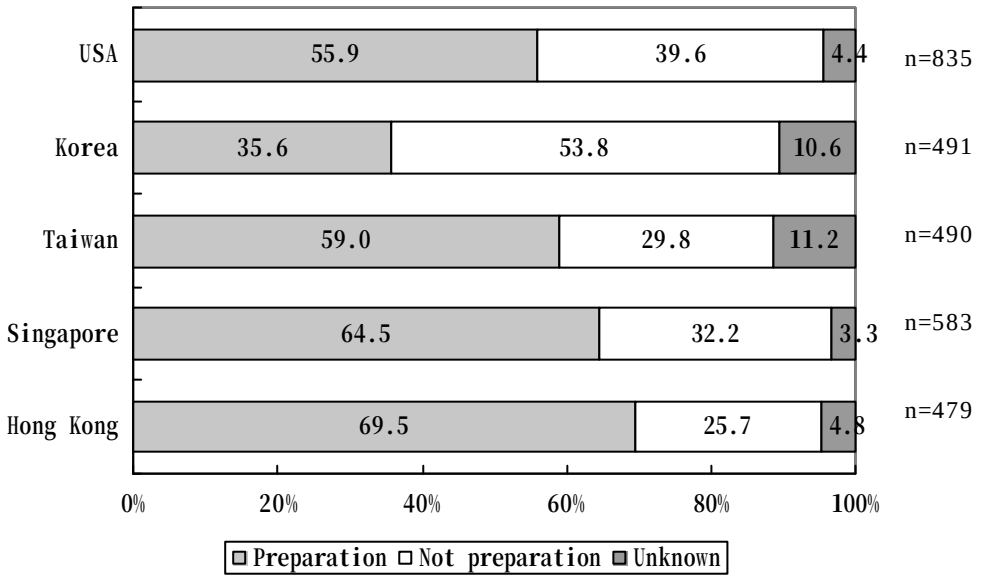


4.3.2 System to update anti-virus software

In view of systematic approach to update anti-virus software, in four countries/regions more than 50% of respondents answered that they prepared such system including management and ruling of updating anti-virus soft wares.

On the other hand in Korea, more than 50% answered they have not established the system yet.

Figure 4.3.2 System to update anti-virus software



4.3.3 Information sources of anti-virus software

In terms of acquiring anti-virus soft ware, 30-50% of respondents in all five countries/regions answered that they used “Internet” as a source of anti-virus soft ware information. Especially Singapore said that about 50% of respondents used “Internet” as such source.

Next to “Internet”, four countries/regions except for Singapore reported “Via the grapevine” then followed by “Advertisements/Press release by vendors”

In Korea, Survey 1999 reported the rank of sources as “Via the grapevine”, “Brochure/ Advertisement”, and “Anti-virus magazine”, while Survey 2000 reported that few answers were counted at “Brochure/ Advertisement”, and “Anti-virus magazine”

Figure 4.3.3 Information sources of anti-virus software

Country / Information Sources	USA		Korea		Taiwan		Singapore		Hong Kong	
	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)
Internet (E-mail, WWW, etc.)	375	41.0%	402	40.4	319	39.4	429	49.4	209	31.4
Anti-virus magazine	14	1.5	42	4.2	59	7.3	54	6.2	45	6.8
Brochure/ Advertisement	10	1.1	69	6.9	59	7.3	34	3.9	13	2.0
Via the grapevine	287	31.4	195	19.6	119	14.7	42	4.8	118	17.7
Technical magazines	34	3.7	56	5.6	60	7.4	65	7.5	76	11.4
Commercial publications	32	3.5	14	1.4	8	1.0	15	1.7	2	0.3
Seminars/Conferences	14	1.5	24	2.4	14	1.7	12	1.4	0	0.0
Advertisements/Press release by vendors	106	11.6	51	5.1	88	10.9	86	9.9	39	5.9
Advertisements/Sales promotions by retailers	8	0.9	67	6.7	45	5.6	25	2.9	45	6.8
Government sources	7	0.8	40	4.0	6	0.7	5	0.6	30	4.5
Others	27	3.0	35	3.5	32	4.0	102	11.7	89	13.4
Total	914	100.0	995	100.0	809	100.0	869	100.0	666	100.0

Note: Includes multiple responses.

（USA：n=519、Korea：**n**=487、Taiwan：**n**=491、Singapore：**n**=584、Hong Kong：**n**=478）

Others : Mass-media (TV, newspaper, radio), newspaper ad., information from head office, information from oversea office, from other department, from consultants, friends,

no information available, etc.

4.3.4 Criteria when selecting anti-virus software

Most favored criteria when selecting anti-virus software was “basic function” in Korea, Taiwan and Hong Kong, “easy installation” in Singapore, while favor of “pre-installed” software accounted for 26.5% in the U.S

The criteria by each standard varied among countries/regions and the U.S. most favored ”pre-installed” software as well as “vendor reputation” rather than “basic function” or “price”. In contrast, respondents in Taiwan and Singapore reported “ease of handling” and” easy installation” as top criteria, while Korea favored “ ease of updating”

Table 4.3.4 Criteria when selecting anti-virus software

Criterion \ Country	USA		Korea		Taiwan		Singapore		Hong Kong	
	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)
Type of hardware and/or operating system	47	3.8%	136	10.0	68	5.1	129	6.6	164	9.8
Basic function (Detection, Protection, Restoration)	67	5.5	232	17.0	181	13.5	216	11.0	273	16.3
Price range	68	5.6	134	9.8	96	7.2	229	11.7	206	12.3
Ancillary functions	15	1.2	21	1.5	67	5.0	59	3.0	102	6.1
Processing speed	21	1.7	89	6.5	90	6.7	145	7.4	128	7.6
Ease of handling	43	3.5	85	6.2	150	11.2	221	11.3	146	8.7
Easy installation	26	2.1	87	6.4	166	12.4	243	12.4	159	9.5
Ease of updating procedure	109	8.9	187	13.7	122	9.1	208	10.6	162	9.7
Vendor's reputation	206	16.8	126	9.2	106	7.9	129	6.6	163	9.7
Extent of technical support services	17	1.4	47	3.4	82	6.1	90	4.6	80	4.8
Pre-installed	324	26.5	96	7.0	39	2.9	62	3.2	31	1.8
Instructed to purchase or given by the corporate/group headquarters	147	12.0	116	8.5	159	11.8	149	7.6	47	2.8
Others	133	10.9	10	0.7	16	1.2	75	3.8	15	0.9
Total	1223	100.0	1366	100.0	1342	100.0	1955	100.0	1676	100.0

Note: Includes multiple responses.

（USA：n=731、Korea：**n**=465、Taiwan：**n**=490、Singapore：**n**=584、Hong Kong：**n**=479）

Others : Maintenance service, regular updating, latest version, best-sellers, domestic production

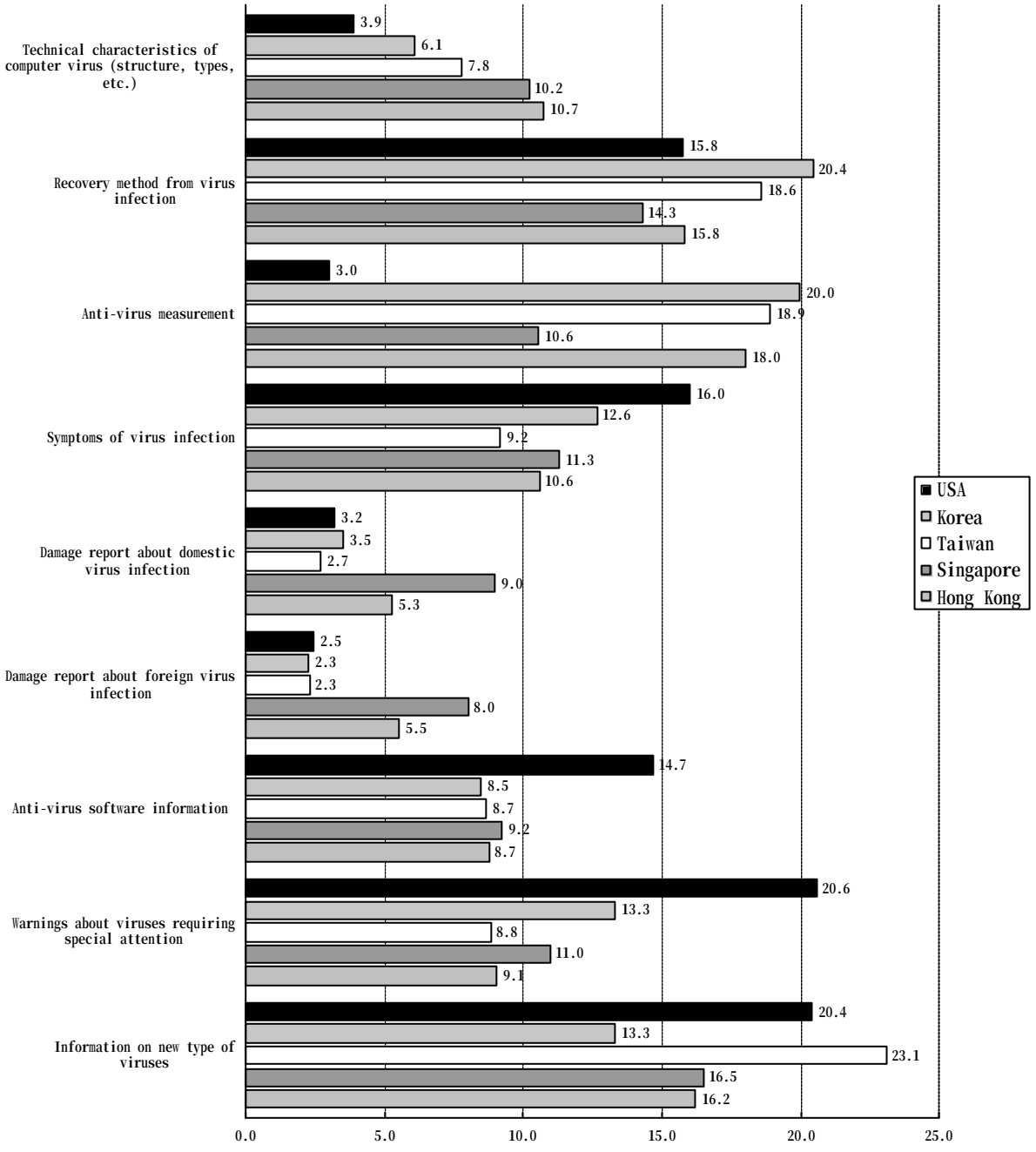
(Korea), upgrade service, packaging, corporate license, independent development, it depends, etc.

4.3.5 Computer virus-related information required by the responding companies/organizations

Out of information required for computer viruses, "information about new types of viruses" was at the highest rank (17.9%) at five-country average, followed by "restoration method" (17.0%), and "anti-virus measurement" (14.1%). Due to rapid expansion of new types of viruses and growing number of reported damages in the year 2000, such information about "new types of virus" became increasingly keen requirement.

As for by-country pattern, needs for the information varied; "new types of virus" in Taiwan, "warning of dangerous virus" and "anti-virus software" in the U.S., " domestic damage report" and "overseas damage report" in Singapore were good examples of information needed.

Figure 4.3.5 Computer virus-related information required by the responding companies/organizations



Note: Includes multiple responses.(USA：n=855、Korea：n=478、Taiwan：n=510、Singapore：n=585、Hong Kong：n=499)

5. Analysis of virus-originated damage reported by the responding companies/ organizations

5.1 Damage by types and number of machines infected

Looking at the number of computers infected among most popular DOS/Windows types, damage reports of 1-10 units accounted for the largest proportion, especially Singapore and Hong Kong hit more than 90%, whereas Korea and Taiwan about 70% and the U.S. merely 50%. On the other hand, the U.S. reported “more than 11 units” took more than 40% portion and “more than 301 units” for about 10% portion.

Figure 5.1.1 Damage by types and number of machines infected: DOS/Windows

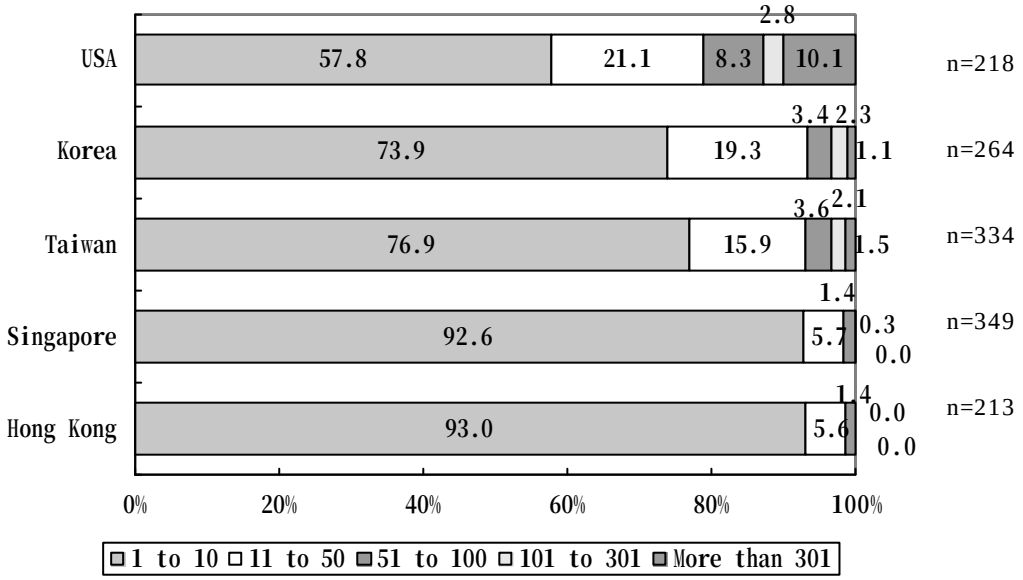


Figure 5.1.2 Damage by types and number of machines infected: Macintosh

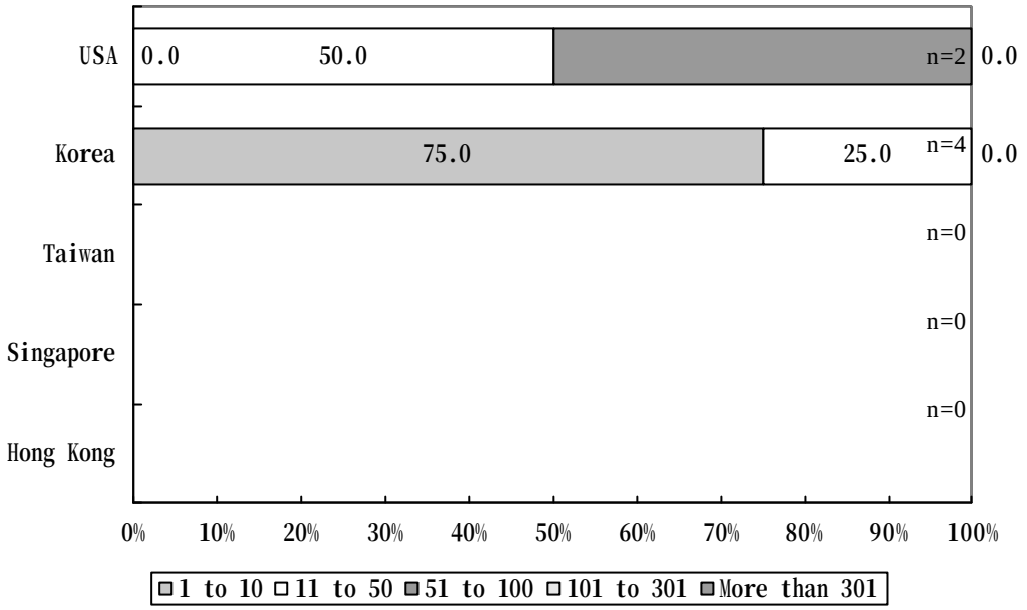
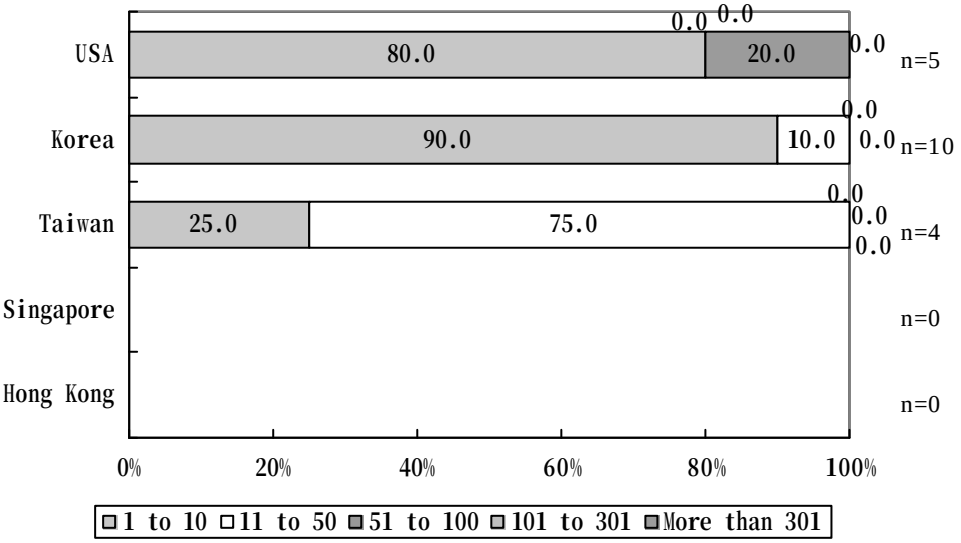


Figure 5.1.3 Damage by types and number of machines infected: Others



5.2 Means of virus detection

As a way to detect virus infection, the U.S. and Korea reported , “text or attachment file name of E-mail” as the first way, and Taiwan, Singapore and Hong Kong reported “by anti-virus software” as No.1 method of detection. Especially more than 30% of detection in Hong Kong was attributable to the anti-virus software.

There was a report in Hong Kong that “computer did not start”, which accounted for 10% of respondents. It is estimated that in Hong Kong computer users generally were not aware of computer viruses as seen from the result also from “by anti-virus software” and “3.1.1 Awareness of computer viruses”.

In Taiwan, the report that “inspection by anti-virus software on gateway machine, groupware machine or server machine” was ranked highest among other countries/regions, but installation of these kinds of anti-virus software in Taiwan was not so high.

In Korea, report of slowing processing speed made the user to detect the virus in many cases. This patter of detection was seen the Survey 1999, which indicates that Korean users are fairly sensitive to the speed of computer processing.

Table 5.2.1 Means of virus detection

Feature \ Country	USA		Korea		Taiwan		Singapore		Hong Kong	
	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)
By anti-virus software	96	15.8%	76	9.3	150	24.8	232	32.5	115	53.7
User-initiated inspection by anti-virus software on client	47	7.7	95	11.6	29	4.8	161	22.6	4	1.9
Routine (or resident) inspection by anti-virus software on client	83	13.6	91	11.1	24	4.0	60	8.4	14	6.5
Inspection by anti-virus software on gateway machine, groupware machine or server machine	9	1.5	20	2.4	75	12.4	64	9.0	0	0.0
Title, text or attachment file name of E-mail	130	21.3	107	13.1	57	9.4	71	10.0	17	7.9
Notice from within the company/organization	48	7.9	56	6.9	31	5.1	26	3.6	5	2.3
Notice from outside the company/organization	78	12.8	26	3.2	28	4.6	13	1.8	4	1.9
By macro alarm from MS Office	11	1.8	12	1.5	2	0.3	14	2.0	0	0.0
Unable to start the computer	4	0.7	69	8.4	46	7.6	18	2.5	25	11.7
Slowing down of processing speed	7	1.1	93	11.4	26	4.3	13	1.8	4	1.9
Unable to read/retrieve file data	13	2.1	44	5.4	31	5.1	12	1.7	12	5.6
Hard disk file record destroyed	6	1.0	29	3.5	17	2.8	6	0.8	5	2.3
Sudden system failure	13	2.1	36	4.4	44	7.3	15	2.1	1	0.5
Emergence of unidentified file	3	0.5	26	3.2	28	4.6	2	0.3	5	2.3
Emergence of symptoms of virus on the display	61	10.0	37	4.5	17	2.8	6	0.8	3	1.4
Total	609	100.0	817	100.0	605	100.0	713	100.0	214	100.0

Note: Includes multiple responses.

（USA：n=247、Korea：**n**=313、Taiwan：**n**=344、Singapore：**n**=349、Hong Kong：**n**=213）

Others : email from other people, updating of anti-virus software, by colleague, mail-server shut-down, by newspaper article, Fire Wall, when other people's computer infected

5.3 Anti-virus software used to detect virus

Most effective anti-virus software to detect virus infection was named Symantec Norton AntiVirus in The U.S., Singapore and Hong Kong, where almost half of the respondents used the product. In Taiwan, Trend Micro PC-cillin and others was most popular, which also used by more than half of respondents. In Korea, Ahnlab V3 was most widely used by more than 60% of organizations

In Survey 1999, Norton Anti-Virus was most popular in the U.S. and Singapore, having 35.4% and 33.4% respectively. Even in Korea this software was ranked second after "others" (including V3 which was not in the list of 1999) with 26.0% share. This trend seems to have continued further.

Table 5.3.1 Anti-virus software used to detect virus

Name \ Country	USA		Korea		Taiwan		Singapore		Hong Kong	
	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)
Aladdin eSafe	0	0.0%	5	1.2	0	0.0	0	0.0	0	0.0
Alwil Avast	0	0.0	1	0.2	3	0.7	0	0.0	0	0.0
Command Software Antivirus	10	3.4	5	1.2	0	0.0	2	0.5	1	0.5
Computer Associates InoculateIT	8	2.7	2	0.5	0	0.0	2	0.5	0	0.0
F-SECURE Antivirus	6	2.0	1	0.2	2	0.5	6	1.5	8	3.7
GriSoft AVG	0	0.0	1	0.2	0	0.0	0	0.0	1	0.5
Kaspersky Antiviral Toolkit Pro	0	0.0	1	0.2	1	0.2	0	0.0	0	0.0
Network Associates VirusScan, NetShield, GroupShield	9	3.0	5	1.2	1	0.2	3	0.8	0	0.0
McAfee	82	27.6	0	0.0	7	1.7	130	33.1	13	6.0
Norman Virus Control	15	5.1	14	3.3	7	1.7	6	1.5	3	1.4
Panda AntiVirus	0	0.0	0	0.0	1	0.2	0	0.0	1	0.5
Sophos Anti-Virus	1	0.3	3	0.7	2	0.5	4	1.0	4	1.8
Symantec Norton AntiVirus	150	50.5	74	17.7	157	38.1	181	46.1	123	56.7
Trend Micro PC-cillin, OfficeScan, ServerProtect, InterScan, Scanmail	2	0.7	14	3.3	203	49.3	35	8.9	27	12.4
Ahnlab V3			248	59.2						
HAURI VIROBOT			34	8.1						
Others	14	4.7	11	2.6	28	6.8	24	6.1	36	16.6
Total	297	100.0	419	100.0	412	100.0	393	100.0	217	100.0

Note: Includes multiple responses.

（USA：n=233、Korea：**n**=308、Taiwan：**n**=344、Singapore：**n**=351、Hong Kong：**n**=209）

Others : Virex、senses、pc doctor199、virus-check service by magazine etc.

5.4 Routes of virus infection

In accordance with rapid expansion of Internet/Intranet, routes of virus infection changed from FD to "attachment file of e-mail" in all countries/regions, which accounted for 79.9% in Singapore, 74.0% in Hong Kong, 72.6% in Taiwan, 71.3% in the U.S., and even 45.4% in Korea.

Second most-popular route of infection other than Internet/Intranet was "download file from network" in the U.S, Korea, and Hong Kong, while "virus invasion from network" accounted for 10% in Korea. Korean respondents in Survey 1999 also reported that 30% of infection route was "outsider invasion via network"

Table 5.4.1 Route of infection

Route \ Country	USA		Korea		Taiwan		Singapore		Hong Kong	
	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)
Attachment file of E-mail	216	71.3%	179	45.4	257	72.6	302	79.9	159	74.0
Download file from network	42	13.9	96	24.4	25	7.1	18	4.8	23	10.7
Virus invasion from network	11	3.6	49	12.4	27	7.6	5	1.3	1	0.5
Software purchased at retailers or through magazines	0	0.0	2	0.5	0	0.0	0	0.0	0	0.0
Floppy disk or other media	8	2.6	56	14.2	32	9.0	31	8.2	13	6.0
From home	1	0.3	14	3.6	12	3.4	3	0.8	4	1.9
From other section	4	1.3	20	5.1	1	0.3	4	1.1	0	0.0
From business connection	3	1.0	8	2.0	9	2.5	4	1.1	1	0.5
Unknown	0	0.0	3	1.0	9	2.5	6	1.6	3	1.4
Others	10	3.3	8	2.0	1	0.3	7	1.9	3	1.4
Unknown	16	5.3	4	1.0	12	3.4	15	4.0	16	7.4
Total	303	100.0	394	100.0	354	100.0	378	100.0	215	100.0

Others: automatic down-load when connected to Internet, etc.

5.5 Restoration Method

As a method to restore computer from virus damage, all five countries/regions reported that they mostly used "anti-virus software as a recovery tool" which accounted for 30-50%. Second method of recovery was "deleting, moving or renaming files by anti-virus software (recovery tool)" in Korea and Singapore, "extermination of virus manually" in the U.S. and Taiwan. On the other hand, "reformatting" amounted to 15.7% in Korea.

Table 5.5.1 Restoration Method

Method \ Country	USA		Korea		Taiwan		Singapore		Hong Kong	
	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)
Extermination of virus by anti-virus software (recovery tool)	167	42.6%	199	33.7	246	52.1	242	46.1	124	51.7
Deleting, moving or renaming files by anti-virus software (recovery tool)	20	5.1	109	18.4	35	7.4	88	16.8	8	3.3
Extermination of virus manually	119	30.4	39	6.6	77	16.3	29	5.5	13	5.4
Deleting, moving or renaming files by hand	36	9.2	49	8.3	21	4.4	43	8.2	11	4.6
Reformatting	11	2.8	93	15.7	33	7.0	24	4.6	15	6.3
Reconstruction of boot records	7	1.8	16	2.7	12	2.5	18	3.4	4	1.7
Reinstallation of program files	8	2.0	43	7.3	7	1.5	32	6.1	16	6.7
Reloading data file from backup files	9	2.3	10	1.7	10	2.1	11	2.1	1	0.4
Reentering data	8	2.0	11	1.9	11	2.3	7	1.3	10	4.2
Disusing personal computer or media	0	0.0	12	2.0	4	0.8	10	1.9	7	2.9
Others	7	1.8	10	1.7	16	3.4	21	4.0	31	12.9
Total	392	100.0	591	100.0	472	100.0	525	100.0	240	100.0

Note: Includes multiple responses.(USA：n=242、Korea：**n**=299、Taiwan：**n**=331、Singapore：**n**=334、Hong Kong：**n**=199)

Others： self-made clean-up program, ship for recovery at the shop, ship for recovery at manufacturer, etc.

5.6 Extent of damage

5.6.1 Time required for recovery from virus-originated damage

Duration for the recovery was reported to have been mostly "less than half a day", accounting for 78.9% in Taiwan, 65.2% in Singapore, 63.4% in the U.S., 51.2% in Hong Kong, and 43.4% in Korea. All five countries/regions having reported that it took less than a day (combining "less than half a day" and "half to a day") totaled more than 70% of respondents.

However, in Korea 16.8% was reported to take 2-5 days

Table 5.6.1 Time required for recovery from virus-originated damage

Country / Amount of time	USA		Korea		Taiwan		Singapore		Hong Kong	
	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)
Less than half a day	151	63.4%	132	43.4	270	78.9	225	65.2	107	51.2
Half a day to 1 day	27	11.3	99	32.6	40	11.7	81	23.5	69	33.0
2 - 5 days	23	9.7	51	16.8	26	7.6	28	8.1	20	9.6
6- 10 days	17	7.1	7	2.3	2	0.6	3	0.9	3	1.4
11 – 20 days	8	3.4	6	2.0	1	0.3	2	0.6	3	1.4
21 - 30 days	4	1.7	4	1.3	0	0.0	2	0.6	0	0.0
More than 31days	7	2.9	3	1.0	2	0.6	0	0.0	0	0.0
Unrecoverable	1	0.4	2	0.7	1	0.3	4	1.2	7	3.3
Total	238	100.0	304	100.0	342	100.0	345	100.0	209	100.0

5.6.2 Man-days required for recovery from virus-originated damage

In view of Man-days required for recovery from virus-originated damage, the U.S. and Taiwan mostly reported that it took "less than half a day", while Singapore reported both "less than half a man-day" and "a man-day" ranked closely, and Korea and Singapore reported mostly "a man-day". Four countries/regions other than Korea seemingly took generally "less than a man-day" (combining "less than half a man-day" and "a man-day") which accounted for more than 70%, but in Korea it took mostly "a man-day" (46.2%) and "2-3 man-days" (36.4%) indicating more time and manpower were required for restoration in Korea than other countries/regions.

Table 5.6.2 Man-days required for recovery from virus-originated damage

Country / Number of man/days	USA		Korea		Taiwan		Singapore		Hong Kong	
	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)	Number of responses	Ratio (%)
Less than 0.5	170	71.4%	29	10.1	193	56.9	156	46.0	45	23.4
1	25	10.5	132	46.2	43	12.7	129	38.1	109	56.8
2 - 3	25	10.5	104	36.4	43	12.7	36	10.6	24	12.5
4 –10	11	4.6	15	5.2	31	9.1	12	3.5	4	2.1
11 – 20	1	0.4	1	0.3	5	1.5	1	0.3	4	2.1
21 – 30	0	0.0	3	1.0	10	2.9	0	0.0	0	0.0
More than 31	5	2.1	1	0.3	13	3.8	0	0.0	0	0.0
Unrecoverable	1	0.4	1	0.3	1	0.3	5	1.5	6	3.1
Total	238	100.0	286	100.0	339	100.0	339	100.0	192	100.0

6. Summary

This Survey 200 was conducted for fact-finding of damages of computer viruses in the five countries/regions, U.S, Korea, Taiwan, Singapore and Hong Kong, for the period of December 1999 through November 2000. We received more than 500 answer sheets from each country/region, totaling 2,966 numbers of data.

There are many issues that Japan could learn from damage reports and anti-virus measurements seen in overseas markets for the purpose of Japan's policy implication of anti-virus measurements. This section describes outstanding issues as a summary.

(1) Facts of virus infection

Ratio of virus infection in the organization surveyed for the period of one year showed 62.9% in Korea, and 53.8% in Taiwan, (both over 50%), but only 32.4% in the U.S. illustrating regional differences. In Survey 1999 there was not much difference by region all of which reported more than 50% of infection. This Survey showed rapid expansion of Internet and Intranet brought large threat of computer viruses all over the world, but Survey 2000 showed that there became difference by region in accordance with steps taken toward anti-virus measurement even in the same virus-risk environment.

(2) Types of virus infected

Types of virus infected and reported in Survey 2000 were much different from Survey 1999. In 2000, VBS/LOVELETTER(I LOVE YOU) most actively and widely infected computers on world-wide basis.

W32/CIH virus, which vigorously infected in Korea and Taiwan in 1998 and was reported to damage computers in the world in 1999 (with 17.5% rate), still remains highly infectious in Korea and Taiwan in Survey 2000. This virus is more affluent in Korea than VBS/LOVELETTER(I LOVE YOU).

There are other viruses very active such as W97M/Melissa in the U.S., XM/X97M/Laroux in Korea, Wscript/Kak Worm and W97M/Melissa in Singapore, Win32/Ska in Hong Kong.

(3) Status of Anti-virus measurements

1) Installation of anti-virus software

In view of installation of anti-virus software by type of computer, the U.S., Singapore and Hong Kong showed high ratio of installation regardless of type of computer, but Korea and Taiwan did not show such high installation ratio except for "client machine".

2) In-house system of anti-virus measurements

Whether organization takes in-house control of anti-virus measurements, the U.S. reported that more than half of organization implemented "specialized section/group" but

Singapore reported only 20% has such section/group. Four countries except for Hong Kong reported that the sum total of "specialized section/group" and "a person in charge" reached more than half of respondents, showing there is some systematic measurement in place. However, in Hong Kong 60% of respondents were reported to have no organizational measurement system, which is still under way.

3) Updating system of anti-virus software

System of updating anti-virus software is reportedly "in-place" in more than half of respondents in four countries/regions other than Korea.

(4) Anti-infection measurements

1) Route of infection

Route of infection shifted from previous "via FD" to "attachment file of e-mail" in line with vast expansion of Internet/intranet. This "attachment file of e-mail" was ranked 77.2% in Singapore, 78.9% in Hong Kong, 69.7% in the U.S. and 67.3% in Taiwan, being the highest route of infection in all five countries/regions.

2) Means of virus detection

As a means of virus detection, the U.S. and Korea ranked "from name of e-mail, text and attachment" as No.1, while Singapore, Taiwan and Hong Kong reported "by anti-virus software" as the top. Especially in Hong Kong showed more than 50%, and Singapore reported more than 30% that the virus was detected by "anti-virus software".

(5) Required information

Information required about computer virus was reported as firstly "information about new type of virus", and secondly "restoration method", and then "anti-virus measurement". This shows new findings of Survey 2000 that vast influence and infection of computer virus in the year 2000 made respondents much aware of need to know "information about new types of virus and its patterns", which was not so needed in the previous Survey 1999.